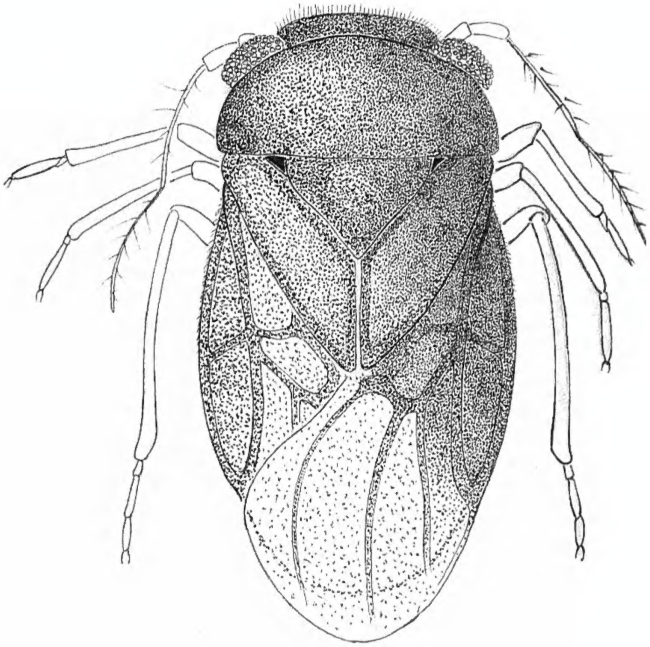
BANISTERIA

A JOURNAL DEVOTED TO THE NATURAL HISTORY OF VIRGINIA



Corixidea major McAtee and Malloch

This minute true bug (Schizopteridae), previously known only from the holotype described in 1925 from Tennessee, is herein reported from two new sites in Virginia and one in Florida (see page 18)

Number 26 ISSN 1066-0712 2005

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ISSN 1066-0712

Published by the Virginia Natural History Society

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Banisteria No. 25 was published on 26 October 2005.

Cover: *Corixidea major* (Heteroptera: Schizopteridae); original drawing by Richard L. Hoffman.
Page 16: Sweetbay (*Magnolia virginiana*); original drawing by John Banister.
Back cover: Cornsnake (*Elaphe guttata*); original drawing by Will Brown.

BANISTERIA

Number 26, 2005

Table of Contents

Some Observations on Growth Form in the Sand Post Oak (*Quercus margarettiae*) and Historic Reports of Boynton's Oak (*Quercus boyntonii*) in Virginia
John F. Townsend 3

Jadera haematoloma, Another Insect on its Way North (Heteroptera: Rhopalidae)
Richard L. Hoffman and Warren E. Steiner, Jr. 7

Behavior of Captive Allegheny Woodrats (*Neotoma magister*) in Virginia
Michael T. Mengak and Andrew K. Zadnik 11

The Occurrence of *Arhaphe carolina* Herrich-Schaeffer in Virginia: An Inexplicable Distribution Pattern (Heteroptera: Largidae)
Richard L. Hoffman 14

Shorter Contributions

The Phantom Darner, *Triacanthagyna trifida*, A Dragonfly New to Virginia
Robert C. Simpson and R. Ann Simpson 17

The Occurrence in Florida and Virginia of *Corixidea major*, An Exceptionally Rare North American Bug (Heteroptera: Schizopteridae)
Richard L. Hoffman, Steven M. Roble, and Thomas J. Henry 18

Early Terrestrial Emergence of a Hatchling Northern Diamond-Backed Terrapin (*Malaclemys terrapin terrapin*) on the Eastern Shore of Virginia
Joseph C. Mitchell and Pamela Denmon 19

Winter Activity by an Eastern Box Turtle (*Terrapene carolina carolina*) in Virginia
Joseph C. Mitchell 20

Aberrant Color and Pattern in a Northern Two-Lined Salamander (*Eurycea bislineata*) from Virginia
Joseph C. Mitchell 22

Invertebrate Predation on a Marbled Salamander (*Ambystoma opacum*) Larva in Virginia
Joseph C. Mitchell and C. Todd Georgel 23

Arboreality in a Northern Brownsnake (*Storeria dekayi dekayi*) in Virginia
Jason Gibson, Paige Powell, and Joseph C. Mitchell 24

Southern Ring-Necked Snake (*Diadophis punctatus punctatus*) Phenotype in the Blue Ridge Physiographic Province of Virginia
Joseph C. Mitchell and William D. Brown 26

Miscellanea

Reviews 28
Reports 28
Announcements 30

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Banisteria, Number 26, 2005

Some Observations on Growth Form in the Sand Post Oak (*Quercus margarettiae*) and Historic Reports of Boynton's Oak (*Quercus boyntonii*) in Virginia

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ABSTRACT

The Sand Post Oak (*Quercus margarettiae*) is a small tree typical of sandy upland sites in the Coastal Plain of the southeastern United States, including southeastern Virginia. Unusual rhizomatous growth forms of the species were observed at three Virginia sites by the author. In each case, the strongly clonal stems could be traced to the root system of a tree-sized individual of *Quercus margarettiae*. Literature reports of similar growth patterns in Virginia *Quercus* were also discovered for White Oak (*Quercus alba*) and purported specimens of Boynton's Oak (*Quercus boyntonii*), a species known historically from Alabama and Texas. Upon examination, specimens from Virginia identified as *Q. boyntonii* proved instead to be *Q. margarettiae* and it is supposed that their dwarfed and perhaps clonal nature led to their misidentification as *Q. boyntonii*. Examples from the literature and personal observations are used to describe some poorly documented growth forms found in oaks with particular reference to clonal growth produced by tree-form individuals.

Key words: clonal, *Quercus boyntonii*, *Quercus margarettiae,* rhizomatous, sandhill.

INTRODUCTION

The Sand Post Oak (*Quercus margarettiae* Ashe) is a small to medium-sized tree of the southeastern U.S., where it is most often encountered on coarse-textured soils dominated by well-drained sands or gravels (Godfrey, 1988; Nixon & Muller, 1997). Field work in Virginia since 2001 has revealed the presence of a somewhat aberrant growth form of *Q. margarettiae* which mimics that of "running" oak species present south and west of our area.

During field work in the southeastern Coastal Plain since the early 1990s, the author has encountered low, sprout-form oaks as a prominent ground cover in numerous upland ecosystems maintained by fire. In many cases, the diminutive size of these oaks is ascribed to the effects of repeated fire or mechanical stress, most often with good reason. There exists, however, a subset of these species that reach their maximum height (and sexual maturity) at shrub size and often possess a decidedly rhizomatous habit regardless of disturbance by fire or mechanical means. The growth form and reproduction of these taxa (such as *Quercus pumila*, *Q. minima*, and a distinctive "form" of *Q. virginiana*, among others) has been widely acknowledged in the literature. In this paper, a poorly documented growth form is discussed in which arboreous individuals of *Quercus* simultaneously produce rhizomatous colonies of low stems.

OBSERVATIONS

Within severely fire-suppressed upland habitats of the Virginia Coastal Plain, low, rhizomatous patches of *Q. margarettiae* were encountered at three sites in two counties (New Kent and Suffolk City) during the 2002, 2003, and 2004 growing seasons. These stations are located on "sandhill" deposits associated with the Blackwater and Chickahominy rivers. In each instance, the rather dense colonies of low stems were located first and later noted to be relatively near tree-form individuals of the same species. Excavation of stems in the coarse soils revealed not the individual root systems characteristic of seed-derived stock, but long, slender, horizontal rhizomes terminated by short, leafy stems. In each case, these were connected to a nearby tree-form *Q. margarettiae*. Also in each case, no recent evidence of stressors (such as mechanical clearing or fire) were noted that might produce such a sprout response, nor was any evidence of fertile stems found. Specimen data is as follows:

Suffolk City: International Paper Company property-undulating *Quercus laevis* - dominated sandhills 1.8 km southeast of Cherry Grove Landing. Common within Turkey Oak (*Q. laevis*) - Longleaf Pine (*Pinus palustris*) sandhill habitat. Other associates include *Lyonia mariana, Gaylussacia frondosa, Kalmia angustifolia, Vaccinium crassifolium, Carex floridana*, etc. Specimens taken from a low, sprawling form of the species which locally forms dense thickets in the presence of tree-sized *Q. margarettiae*. John F. Townsend #2839, 10 July 2002 (Deposited at Massey Herbarium of Virginia Tech [VPI] and the herbarium of the College of William and Mary [WILLI]).

New Kent Co.: Collected from woods just west of Co. Rt. 618, just north of bridge over Chickahominy River. Dry, sandy river terrace. Specimens collected from the root systems of a tree-sized *Q. margarettiae*. John F. Townsend #3144, 15 August 2003 (VPI).

New Kent Co.: New Kent Forestry Center property - sandy peninsula of upland woods within floodplain of Chickahominy River, 3.5 km SE of Providence Forge. Dry, open woods with *Dichanthelium boscii, D. ovale* var. *addisonii, D. fusiforme*, *Scutellaria elliptica, Arabis lyrata, Carex muhlenbergii, Pityopsis graminifolia* var. *tenuifolia*(?). Abundant low, rhizomatous stems in the area in addition to trees of normal stature. John F. Townsend #3264, 9 July 2004 (VPI, WILLI).

Coincidentally, reports in the literature were uncovered that mirrored these field experiences in Virginia quite well. Fernald (1942) mentioned this rather unusual growth form in relation to collections he made in southeastern Virginia:

> "In dry woods near the Nottoway River, near Peter's Bridge in Sussex and Southampton Counties, there occur dense circles of low oaks with prolonged subterranean rooting stems. These low shrubs, often only 2.5-5 dm. high are all sterile and they do not have the foliage of any of the low and stoloniferous species of the extreme South. Returning in June, 1941, to study them further and, if possible, to secure young fruit, we were so fortunate as to find, southwest of Lambs, a very complete circle of such young leafy shoots directly under the outer tips of the branches of a large standing White Oak. Digging down at the inner side of the circle we found that the deceptive sprouts were attached to roots, often 3-6 cm. in diameter, of the large tree. Such sprouting in *Quercus alba* is not mentioned in any discussions of the species which have come to hand. It is represented by our nos. 12,134 and 12,998."

Also during field work in southeastern Virginia, Fernald noted making collections of "*Quercus stellata* var. *boyntonii*", a very rare and insular rhizomatous species of the Texas and Alabama sands. This species was still rather poorly circumscribed and understood in the 1930s and 1940s, being wrested from obscurity only in the mid-1950s (Muller, 1956). In fact, very few populations of this taxon are known today. Fernald's (1937: 342) report of the taxon in Virginia reads as follows:

> "The comparatively rich woods were full of *Clematis ochroleuca*, *Carex striatula* Michx., *Scrophularia marilandica*, the upland *Houstonia tenuifolia* and other species we saw nowhere else during the summer, and some of the scrubby oaks were *Quercus stellata* var. *boyntonii* (Beadle) Sargent (*Q. boyntonii* Beadle), the range given by Small (Man.) as "Appalachian Valley, Ga. and Ala."

In his enumeration of species in the same volume, Fernald (1937: 404) lists:

> "*Quercus stellata* Wang. var. *boyntonii* (Beadle) Sarg. Sussex County: shrubs 1-1.5 m. high at border of dry sandy woods, Burt, F & L no. 6191."

At the same site, Fernald also reported the related *Quercus margarettiae* (as *Q. stellata* var. *margaretta*):

> "*Quercus stellata* Wang. var. *margaretta* (Ashe) Sarg. Sussex County: dry sandy woods, Burt, F & L nos. 6189 and 6190."

Fernald never mentions the flowering or fruiting disposition of these shrubs, one of the critical features needed for the identification of the permanently dwarfed *Quercus boyntonii*.

Given that the various taxa of the post oak complex have been taxonomically confusing over the years (e.g., *Quercus drummondii, Q. similis, Q. boyntonii*) and that Fernald never mentioned finding fertile material, it seemed that the prodigious rhizome production of *Q. margarettiae* witnessed in 2002-2004 could have also led to Fernald's report of *Q. boyntonii* as a member of the Virginia flora. Moreover, the presence of specimens identified by Fernald as "*margaretta*" in consecutive number with those identified as "*boyntonii*" at the same site indicates that the two collections perhaps belonged to the same taxon or even individual.

Fernald likely used Small (1933) to identify his specimens. Small's Manual of the Southeastern Flora differentiates *Q. boyntonii* based on "Leaf-blades cuneate in outline, brown or yellowish beneath, the 3-7 lobes low and rounded" and listing the habit of the species as "Shrub 1-5 m. tall…" *Quercus stellata* and *Q. margaretta* were keyed based on "Leaf-blades obovate in outline, gray or yellowish beneath, the 3 –5 ample lobes often broad and dilated", with *Q. margarettiae* being further differentiated based on "Leaf blades with rounded upper lobes…" The habit of *Q. margarettiae* is listed as a "Shrub, or tree sometimes to 10 m. tall…" Given the subtleties of leaf form often used to differentiate the white oaks, this description seems inadequate to characterize the differences between these three species, especially in sprout or shrub forms.

Two specimens at the Gray Herbarium, Harvard University, labeled by Fernald as *Q. margarettiae* var. *boyntonii* (Fernald's #6191, discussed above, as well as his #8237) were studied by the author in 2004 and compared with true *Q. boyntonii* material, as well as *Q. stellata* and *Q. margarettiae*. These specimens indeed proved to be collections of sterile *Q. margarettiae*, differing from *Q. boyntonii* in characters of leaf shape (shallow terminal lobes in *Q. boyntonii*, lateral and terminal in *Q. margarettiae*), leaf and twig vestiture (densely pubescent in *Q. boyntonii*, glabrous or nearly so in *Q. margarettiae*), and twig dimensions (relatively stout in *Q. boyntonii*, relatively slender in *Q. margarettiae*). Interestingly, one of the two specimens (Fernald and Long #8237) was collected at the same locality as Townsend #2839, where the odd growth form of *Q. margarettiae* was first noticed by the author.

DISCUSSION

The observations and collections outlined in this article indicate the ability of individual oaks to simultaneously produce a combination of growth forms without first being subjected to fires or mechanical disturbance. In his discussion of vegetative reproduction in *Quercus*, Muller (1951b) reported observations of the Spanish oaks *Quercus pyrenaica* and *Q. ilex* in which he noted "…many undisturbed mature trees … exhibiting a wide circle of shoots at some distance from their bases…" The rhizomatous nature of these shoots was confirmed by excavation and likened to that of "*Quercus breweri* of California and numerous other species. It differs principally in the fact that the rhizomatous shoots of *Q. pyrenaica* and *Q. ilex* are produced after tree habit is assumed." In the same discussion, Muller was careful to differentiate between root sprouting due to injury and the apparently spontaneous production of rhizomatous shoots by individual trees found in level, undisturbed soils. These observations provide some of the closest parallels to the growth forms seen in *Q. margarettiae* in the Virginia Coastal Plain.

Muller (1951b) also lists some of the species in North America known to have some form of rhizomatous habit, noting that the majority of them are southwestern, western, and Mexican in distribution, owing to the tendency of the rhizomatous habit to dominate in such semi-arid regions where seedling establishment can be arduous. However, he also lists three species that are eastern exceptions to this rule: "…*Quercus minima* on the sandy Coastal Plain in Florida, *Q. margaretta* Ashe on sand beds of the Gulf Coastal Plain, and *Q. ilicifolia* Wang. confined to sandy barrens and rocky hills in the northeastern United States." He points out that "the plants involved are confined largely to edaphically adverse habitats", implying that their rhizomatous nature is at least partly caused by these conditions. He does not provide further details on the rhizomatous nature of *Q. margarettiae* in the Gulf Coastal Plain.

Rhizome production by mature, tree-form *Quercus* of any species is not well-reported in the literature and doubtless occurs in species other than *Q. margarettiae, Q. alba, Q. pyrenaica*, and *Q. ilex*. These observations also suggest that the line between arborescent and clonal growth forms may be vague and that taxonomic treatments of the oaks often fail to describe the range of variation in stature found in this genus, especially as it relates to species at the extremes of their range or fire regime. For instance, while *Q. margarettiae* is recognized as a "small scrubby tree" by Harrar & Harrar (1962), Muller (1951a) describes it as "low or moderate-sized shrubs branched from the base" and gives the species the vernacular name of "runner oak." Brown & Kirkman (1990) describe it as "a small, scrubby tree with irregular growth form" and Godfrey (1988) describes the species as a "small, scrubby, deciduous tree, often forming small thickets or groves by subterranean runners." Sargent (1961) notes a freely stoloniferous form (f. *stolonifera* Sarg.), known from Alabama and Oklahoma, but no mention is made of the propensity of trees of *Q. margarettiae* to produce such clonal patches. Little, if any, mention is made of whether these growth forms are simply reactions to disturbance (a common occurrence in fire-maintained landscapes) or are truly a part of the species' normal growth pattern. Personal observations of *Q. margarettiae* made in the Carolinas, Georgia, and Virginia have invariably been of small trees except in areas affected by chronic fire, in which case sprouts of *Q. margarettiae* and familiar tree-form oaks (e.g., *Q. stellata, Q. falcata, Q. marilandica,* among others) grow intermixed in a low, woody vegetation layer with many herbaceous species. In these fire-maintained situations, rhizomatous growth forms are not easily recognized due to the low stature of nearly all woody species.

Due to the long history of fire suppression at the Virginia sites mentioned, the partly clonal nature of *Q. margarettiae* in Virginia seems to demonstrate that this species is capable of a combination of growth forms regardless of recent fire history. Nixon & Muller (1997) note the propensity of members of the live oak group "to produce rhizomatous growth and clonal shrubs in juvenile stages, and in response to damage, fire, and poor soil conditions…" Muller's (1961) treatise on the live oaks similarly details the occurrence of vegetative (rhizomatous) tendencies in *Q. virginiana*, and these growth forms have been encountered by the author as well. In the case of *Q. margarettiae* and more so in *Q. alba*, similar clonal tendencies are not as well-documented, and reports of clonal or shrub-form *Q. margarettiae* in the literature seldom contain any insights into the causes of such vegetative growth. The production of rhizomatous growth by mature, tree-sized oaks in stressful soil types of the Virginia Coastal Plain seems to indicate the ability of these species to behave somewhat like their clonal western congeners when conditions permit.

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Banisteria, Number 26, 2005

Jadera haematoloma, Another Insect on its Way North (Heteroptera: Rhopalidae)

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ABSTRACT

Recent collection records for the Red-shouldered Bug (or Soapberry Bug), *Jadera haematoloma*, in eastern United States indicate northward dispersal of this nominally subtropical species as far as Maryland since about the mid-1980s. Perhaps utilization of the Golden Raintree, *Koelreuteria paniculata* (and other *Koelreuteria* species), an important host plant now extensively planted as an ornamental, has been facilitated by warmer climatic regimes during the past several decades.

Key words: dispersal, eastern United States, Golden Raintree, *Jadera haematoloma*, Red-shouldered Bug.

While it is well known that biotas ebb and flow geographically in response to fluctuating climatic regimes, an increasing body of evidence suggests that insects in several orders have extended their ranges northward within the past few decades. Aside from their sudden appearance in well-collected regions, the movement of such species can often be traced by information on the pin labels of museum specimens. The range expansion of a large fulgorid, *Calyptoproctus marmoratus* Spinola, was recently documented from such information (Hoffman, 2005).

We now record another instance of rapid northward dispersal by the rhopalid bug *Jadera haematoloma* (Herrich-Schaeffer). While similar in size and body form to the common Box Elder Bug (*Boisea trivittata*), this insect is uniformly dull black except for the eyes, ocelli, pronotal margins, and apical abdominal segments, which are crimson or scarlet. The specific name refers to the broad "blood-red sides" of the pronotum (the alternative name "Soapberry Bug" denotes a common host plant, *Sapindus saponaria* L.).

Historically, knowledge of the species' natural distribution has been only slowly accumulated. Van Duzee's catalog (1917) listed only six states: Florida, Kansas, Colorado, Texas, Arizona, and California. A few years later, Blatchley (1926) added Alabama and Illinois, the latter based on a specimen considered to be adventive, from a city park in Chicago. Subsequent records have been sparse. Brimley (1938) cited Biltmore, near Asheville, North Carolina, and Froeschner (1942) added Missouri to the mid-continental area, while considering *J. haematoloma* to be "apparently very scarce." Records from Colorado and Iowa were added by Slater & Baranowski (1978) with the note that "nothing seems to be known of its habits." It has been reported as a household nuisance in Oklahoma and Texas (Wheeler, 1982). Recent Tennessee records have been reported (Vail et al., 2002).

Existing locality records therefore define a basically Neotropical distribution along the southern tier of states (Florida to Arizona) and south through Central America and the West Indies to Colombia and Venezuela (Henry, 1988), but also northward in the interior of the continent as far as Colorado, Iowa, and Illinois. Early documentation suggests that the species is endemic in austral North America while providing no information on its host plants.

The first comprehensive account of the biology and host plants of *J. haematoloma* appeared only 18 years ago (Carroll & Loye, 1987). These authors conducted extensive field investigations on the host preferences of five members of this genus, and established a close affinity of *J. haematoloma* with plants in the family Sapindaceae, both the native species *Sapindus saponaria* var. *drummondi* (Hooker & Arnott) (Soapberry, southwestern U. S.; also known as China Tree, Chinaberry, False Dogwood, Jaboncillo), and *Cardiospermum corindum* (L.) (Balloon Vine, Florida), as well as Golden Raintree, *Koelreuteria paniculata* Laxmann, an Asiatic species extensively cultivated in this country. A second species of Golden Raintree, *Koelreuteria elegans* Seem., introduced in Florida, was the new host studied by Carroll et al. (2003). The distribution map compiled by Carroll & Loye (which did not include published records) revealed the close correspondence of records for the bug with the ranges of the two native plants, but included some undocumented records as far north as Lake Superior and eastern Virginia (unspecified as to host plant but which could have been *Koelreuteria* or possibly *Cardiospermum halicacabum* (L.), another balloon vine species planted and escaped widely in eastern North America). Observations of the bug "feeding on seeds of goldenrain tree" [*Koelreuteria* sp.] were noted in Tennessee (Vail et al., 2002). We take this occasion to document recently compiled information about the northward spread of *J. haematoloma* in the Atlantic Coast states.

Georgia

There are not, to our knowledge, any published locality records for the species in Georgia. Dr. Cecil L. Smith kindly provided the following information on specimens in the University of Georgia (UGA) Museum of Natural History: *Clarke Co.*: 1978, 1979, 1980, 1981, 1982, 1989; *Lamar Co.*: 1982; *Richmond Co.*: 1974, 1985; *Troup Co.*: 1986. The lack of records earlier than 1974 may be real rather than apparent, as it is highly improbable that *J. haematoloma* was overlooked by P. W. Fattig during his intensive insect collecting throughout Georgia during the period 1926-1953. Student collectors at the University of Georgia would surely have taken such a conspicuous insect were it present around Athens (Clarke Co.) prior to 1978.

South Carolina

We are not aware of published records for this species in South Carolina. Dr. A. G. Wheeler consulted the Clemson University Arthropod Collection (CUAC) to obtain the following records for that state: *Darlington Co.*: 1989; *McCormick Co.*: 1987; *Pickens Co.*: 1986. These dates are consistent with data for Georgia and North Carolina, and the lack of captures prior to 1986 around Clemson University is *prima facie* evidence for its recent arrival there.

North Carolina

Brimley (1938) provided an early record for the vicinity of Asheville, North Carolina, which appears unlikely as part of a natural lowland range. The capture of *J. haematoloma* there, at the extensively landscaped Biltmore Estate in 1933, suggests recovery of anthropogenic migrants brought in on nursery stock. One specimen in the UGA collection was taken in Asheville in 1953, suggesting the possibility of a surviving population from the initial introduction. The species has been found more recently in eastern North Carolina: specimens in the North Carolina State University collection were taken at Raleigh (Wake County) from 1987 through 1993, and an unspecified site in Bladen County in 2000. Robert L. Blinn (pers. comm.) states that the species now occurs commonly on Golden Raintree around Raleigh.

Virginia

The distribution map in Carroll & Loye (1987) includes a locality in extreme southeastern Virginia, but without reference to its basis. Inquiry made to Dr. Randall Schuh at the American Museum of Natural History (one of the two museums mentioned by those authors) disclosed that no specimens from Virginia are in that collection, nor do any exist in the National Museum of Natural History (NMNH). However, *Jadera* does occur at Norfolk, as attested by a photograph taken at the Norfolk Botanical Garden by Leonard Johnson on 29 November 2001, showing a cluster of adults and nymphs.

A specimen in the Virginia Museum of Natural History (VMNH) substantiates the earliest known capture of this bug in Virginia, made in Bedford County at the Lynchburg water treatment plant on the James River, 6 km NNE of Boonsboro, 17 August 1980, by J. Peyton Moore. Field notes state that this insect was collected "...below light, on wall above settling tanks."

Additional Virginia specimens of *J. haematoloma* (VMNH 2) are labeled only "Mathews Co. / Sept. 17, 1999 / McClanahan." A label on each specified "raintree, boxwood, spirea, japonica" as plants at the capture site. Mathews County is beside the Chesapeake Bay at the end of the Middle Peninsula of Virginia, about 270 km due east of the Lynchburg site and 600 km northeast of Asheville.

Farther north, a more recent association of *J. haematoloma* with *Koelreuteria* spp. was made in suburban Alexandria, Virginia, where a thriving colony of the bugs was observed and sampled by Robert B. Faden, of the Department of Botany, Smithsonian Institution. Eleven adults and series of eggs and nymphs of all instars (USNM) are labeled "VIRGINIA: Alexandria, Del Ray, 25 September 2002, R. B. & A. Faden" and eight more adults have the same data except the date of collection, "16 December 2002." He reported "hundreds and more likely thousands of these insects…not just an introduction but an invasion" in his yard and garden, where *K. bipinnata* and *K. paniculata* trees had been planted for more than ten years, and were producing many seeds, which germinate readily. Adults survived winter, some by moving into the house as well as outdoors in window wells and other protected spots, and mating pairs were seen in mid-April 2003. If the feeding of the bugs kills seeds, it could be of value in control of this potentially invasive plant, but the nuisance aspect of the insect may outweigh the benefit.

The most recent capture of a single specimen by S. M. & P. A. Roble on 14 October 2005 was at Lewis Ginter Botanical Garden, Henrico County. The bug (VMNH) was walking on an asphalt path near exotic plants.

Maryland

During the same time period, two records of *J. haematoloma* from Maryland also came to our attention. An adult was collected by Ed Cohen (Maryland Entomological Society) on a brick walk area in front of the Waverley Mansion, Marriottsville, Howard County, on 24 September 2002. Identification of this specimen (and the VA series above) was confirmed by Dr. T. J. Henry, Systematic Entomology Laboratory, USDA. On 8 November 2002, at least 21 specimens were taken by Gaye Williams, Maryland Department of Agriculture (MDA; specimens in that collection) near Parole, Queen Annes County, on *Buddleia* and *Viburnum* shrubs that were about 12 m from a planting of six *Koelreuteria paniculata* trees. Examination of leaf and seed pod litter around these trees on 7 February 2005 did not yield additional specimens, indicating that the relatively cold winter freezes in the years following 2002 may have eliminated this colony.

DISCUSSION

The new host associations of *J. haematoloma* on *Koelreuteria* species has become so frequent and conspicuous that the common name "Golden Rain Tree Bug" also spelled as "Golden Raintree Bug" or "Goldenrain Tree Bug" has come into usage (Keith & Wong, 2003; Cranshaw, 2004; Santana, 2005) in addition to "Red-shouldered Bug," "Soapberry Bug" and, using the genus name, "Jadera Bug." Color images of *J. haematoloma* are provided in the above references. A near-obligate association with the Golden Raintree may have facilitated recent dispersal of the bug with nursery stock of this popular ornamental shrub in the central Atlantic States, reflecting the pervasive eastward spread of the related *Boisea trivittata* in the early 1900s, following the widespread introduction of Box Elder (*Acer negundo* L.) as an ornamental tree in hundreds of urban situations (Slater & Schaefer, 1963; Hoffman, 1975). Progressively milder climate in this region during the past several decades must surely have facilitated northward migration of *J. haematoloma*. This species has also been shown to undergo rapid cryptic host-race development upon moving to the introduced plants (Carroll et al., 2003); the establishment of northern colonies will likely result in additional unique populations.

It is interesting that despite their close relationship and shared ability to disperse rapidly, *J. haematoloma* has spread northward by adapting to one or more different, cultivated host plants ("neophagy"), whereas *B. trivittata* has remained a strict monophage following the eastward introduction of its original host plant. Perhaps *B. trivittata* has the potential to adapt, under different conditions, to a related species of *Acer*.

ACKNOWLEDGMENTS

Robert L. Blinn provided information on the host plant of *J. haematoloma* and access to the North Carolina State University insect collection (NCSU). Alfred G. Wheeler, Jr. provided records from the Clemson University insect collection (CUAC) as well as a fruitful prepublication review of the manuscript. Much editorial help was also received from Steven M. Roble. Cecil L. Smith transmitted records from the University of Georgia collection (UGA). Leonard Johnson shared his photograph and information on the occurrence of *Jadera* at Norfolk, Virginia. Randall T. Schuh implemented a search for Virginia specimens in the American Museum of Natural History. We thank the other collectors mentioned in the Maryland and Virginia records for their field observations. Confirmation of the identifications, help and advice from Thomas Henry, Systematic Entomology Laboratory, USDA, is much appreciated.

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Banisteria, Number 26, 2005

Behavior of Captive Allegheny Woodrats (*Neotoma magister*) in Virginia

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ABSTRACT

We studied two captive Allegheny Woodrats in order to observe their typical nocturnal habits and mating behavior. They spent most of their time (63%) resting and sleeping. The next greatest amount of time was spent exploring and grooming (10.3%), followed by feeding (9.6%) and, finally, defecating (1.5%). Their mating habits include sexual chases, boxing, and multiple matings over a short period of time. The pair mated many times without the female necessarily becoming pregnant.

Key words: Allegheny Woodrat, mating behavior, *Neotoma magister*, time budget.

INTRODUCTION

The social behavior of Allegheny Woodrats (*Neotoma magister*) has been studied in some depth as it pertains to hierarchical organization and population density. Kinsey (1976) studied various-sized groups of captive woodrats and recorded the type of organization, including individual social rank and the resulting behaviors, including agonistic interactions, injuries, and deaths. Kinsey (1977) also studied agonistic and male-female social status in captive breeding colonies. Newcombe (1933) and Poole (1940) discussed social behavior in wild populations and concluded that they are usually rather solitary animals and often quarrel with conspecifics. Fitch & Rainey (1956) noted that Eastern Woodrats (*N. floridana*) are somewhat territorial, defending their house and surrounding area from all intruders. However, none of these studies has really described what individual, solitary woodrats do on a nightly basis.

Furthermore, few of these studies have described the courtship and mating habits of *N. magister* in detail. Kinsey (1976) provided some information, describing ritualized battles, as did Poole (1940), but both studies are missing a few aspects of this very interesting behavior. Our study attempted to fill in some of the gaps. We describe, in detail, the courtship and mating habits of one pair.

METHODS

Two Allegheny Woodrats, a male and female, were kept in a cage constructed of wood and hardware cloth, measuring 0.58 x 0.58 x 2.43 m. The cage was placed in a secure room in the Environmental Science Building, Ferrum College, Ferrum, Virginia. It was divided in half with a piece of plexiglass to keep the animals separated. Each rat was provided with bricks for cover, numerous sticks of various sizes, and nesting material such as hay, flax, and wool. They were fed a combination of rat chow, apples, and bananas, and provided water ad libitum. The lights were set on a timer with a 12L:12D cycle.

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The two woodrats were observed at least once a week at night for up to two hours. The first few times they were observed under a dim red light but we later switched to using a pair of night vision goggles. Zervanos & Davis (1968) found that Allegheny Woodrats perceive red light like white light and reduce their activity. We recorded the activities of each woodrat while they were separated and then removed the divider, allowing them to interact. After they stopped showing much activity, we replaced the divider. We used a stopwatch to record the length of time that each rat engaged in specific behaviors. They were inactive most of the time. Data were recorded as minutes or fractions of minutes (to the nearest 15 seconds) that each individual engaged in an activity.

After the woodrats mated, we kept them separated in an attempt to accurately measure the length of gestation. We also monitored the female's weight after mating by trapping her in the cage about twice weekly.

When observed under a red light, woodrats normally showed little activity, especially the female. She just poked her head out from under the bricks, looked straight at the observer, and retreated back to the brick pile while thumping her feet in alarm. The male sometimes left his nest and explored a little, but this never continued for long. It seemed obvious that they could detect red light just as well as white light. When a pair of night vision goggles became available early in our study, our observations of the animals improved. The woodrats could still detect us watching them, but they seemed to go about their activity relatively undisturbed.

RESULTS

We observed the pair for a total of approximately 30 hours over 10 weeks. With the woodrats separated, we recorded their apparently typical nocturnal activities. These included grooming, exploring, feeding, and defecating. While the female spent most of her time under her bricks and basically out of view, the male constructed his nest alongside his bricks. Since he was much easier to watch and generally more active, most of our observations relate to quantifying his behavior. Based on our observations, we believe that the female's activities are generally similar to those exhibited by the male.

The male spent 68.4% of his time sleeping or resting in his nest. He spent the next greatest amount of time (10.3%) grooming and exploring. His grooming was typical of small mammals. He started by licking his front paws and rubbing his face and whiskers. Next, he licked the rest of his body and legs. Often, he scratched himself using his hind legs. He also turned around and groomed his tail. He normally performed all of these behaviors before and after sleeping, as well as before and after feeding. This sequence usually lasted up to 10 minutes at a time and is obvious evidence as to the cleanliness of these animals.

While exploring his half of the enclosure, the male walked around its perimeter, often stopping to smell and look around (usually at the observer – AKZ). He also rearranged the sticks that had been placed in the cage. He cut them into manageable sizes and lifted them with his mouth while using his teeth for grip. The sticks were then placed around the nest, forming a type of barricade. The female also did this, a typical behavior of woodrats. Poole (1940) and Fitch & Rainey (1956) described how the passages to woodrat nests are frequently blocked by an assortment of sticks, stones, leaves, and other materials. This is consistent with our observations of wild Allegheny Woodrats that generally have a collection of leaves and sticks near the entrance to the crevice. We suggest that movement of this debris serves to alert the resident woodrat. Poole (1940) also noted that another miscellaneous pile of objects was stored next to the nest. Also, during his explorations around the cage, the male collected any of the softer materials placed there and added them to his nest.

The male was observed feeding about 9.6% of the time. He typically left his nest, grabbed a piece of apple with his front paws and began feeding. While feeding on a food pellet, he held it with his front paws and sat back on his hind legs. This feeding posture has been described previously (Newcombe 1933; Poole 1940). Feeding normally occurred away from his nest, although a few times the male carried food back to the nest with his teeth. Each feeding event normally lasted about 2-4 minutes.

The male defecated about 1.5% of the time. As is typical of woodrats, he created scat piles, which were used on a regular basis; in his case he normally used one corner of his cage. Poole (1940) also observed this very sanitary behavior of woodrats. We observed the male moving some of his scat farther into the corner, tucking it under the hardware cloth that lined the inside of the cage. We believe he also may have eaten some of his scat. This also was observed in one case by Poole (1940) but has not been reported elsewhere. Further study of captive woodrats would be necessary to determine the prevalence of this behavior. It may be restricted to an individual or an artifact of confinement.

The first several times we removed the divider, the rats stayed in their own nests as if they were not really sure how to behave. Generally, they remained inactive for almost an hour before approaching each other, sniffing and with whiskers twitching rapidly. Then the male groomed his face and began to follow the female, all the while making what Kinsey (1976) described as a "low-pitched raspy sound, similar to heavy breathing." If he got too close to the female, often backing her into a corner, she squeaked loudly, seemingly distressed. The female also made a whimpering-like sound on occasion. At some point during these chases the two woodrats faced each other, stood on their hind feet while supporting themselves with their tails, and boxed, kicked, and scratched with their front feet. These behaviors have also been observed by Poole (1940) and Kinsey (1976). These matches lasted a few seconds and were repeated a few times throughout the observation period. The male was not observed scent marking, although this behavior has been described by Poole (1940) and Kinsey (1976) for *N. magister* and by Howe (1977) for several western species of *Neotoma*.

On the third night of observation, it only took about 15 minutes for activity to begin. The two animals began chasing each other; usually, the male chased the female. The male was continuously making the low-pitched raspy sound. They boxed several times throughout the chase and then finally mated. The male mounted the female, made a few rapid pelvic thrusts, and then stayed on her but did not grasp her with his paws. A few times the female dragged him for a short distance. Howell (1926) described how this dragging behavior was possible because the penis of the woodrat is equipped with recurved spines which expand in the vagina allowing the lock to be maintained. Copulation and dragging lasted up to 25 seconds. Kinsey (1976) reported that this behavior often lasted up to 90 seconds. During this time, we observed the two woodrats grooming themselves, the female even turning around to groom her genital region.

After mating was completed, the woodrats went to different areas of the cage and continued to groom themselves, especially around their face and genitals. Then they chased each other and boxed a little more, and then mated again, going through all the same actions. This sequence was repeated as often as 10 times in one half-hour interval. In a few of the resting and grooming periods between copulations, both woodrats laid on their stomachs with their legs extended. This can best be described by comparing them to what museum study skins look like. This prostrate behavior lasted from 10-20 seconds.

We began weighing the female at twelve days post-mating. Her initial weight increased steadily from 339.1 g on Day 12 to 362.5 g on Day 18. Her highest weight was 369.1 g on Day 28. However, her weight leveled out and even decreased slightly by Day 32. On Day 34, the female brought considerable nesting material inside her bricks. Poole (1940) noted that the length of gestation for Allegheny Woodrats was between 30 and 36 days, but by Day 39 the female still had not given birth. Mengak (2002) reported that newborn Allegheny Woodrats weigh 18 g, with an average litter size of 2.3 in the wild. Poole (1940) reported birth weights of 15-17 g, so the weight gain we observed was consistent with a normal pregnancy.

Although it is possible the female was never pregnant, something may have occurred during her pregnancy to cause her to abort. We did not observe any evidence of parturition. Her final weight did not decline to her initial weight. Perhaps the weight gain was just a natural part of her maturation cycle. Our study took place in March and April. Rainey (1956) found that Eastern Woodrats (*N. floridana*) are normally their heaviest in late February or March.

ACKNOWLEDGMENTS

Our general woodrat research program has been supported by numerous grants to MTM from the Virginia Department of Game and Inland Fisheries, USDA George Washington/Jefferson National Forest, National Park Service, MeadWestvaco (formerly Westvaco Corporation) and the Virginia Academy of Science. We thank Joe Mitchell and an anonymous reviewer for helpful comments made to an earlier draft of this manuscript.

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Banisteria, Number 26, 2005

The Occurrence of *Arhaphe carolina* Herrich-Schaeffer in Virginia: An Inexplicable Distributional Pattern (Heteroptera: Largidae)

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ABSTRACT

The largid bug *Arhaphe carolina* Herrich-Schaeffer is added to the insect fauna of Virginia on the basis of specimens from two Coastal Plain localities and a third in the Ridge and Valley province. This species was previously recorded from no farther north along the Atlantic coast than North Carolina.

Key words: *Arhaphe*, Heteroptera, Largidae, Virginia.

On the recent occasion of collecting tiger beetles with Dr. C. B. Knisley on a hillside near Oriskany, Virginia, my attention was engaged by a small colorful insect resembling a mutillid wasp scurrying across the trail. Closer inspection disclosed the singular facies of a rare largid bug, *Arhaphe carolina*, so far not recorded from this state.

The geographic range of this insect has been defined only very slowly. It was originally described (Herrich-Schaeffer, 1850) from "Carolina" without further details. Six decades later, the Van Duzee catalogue (1917) added only Georgia and Arizona. Blatchley (1926) documented a few sites in Florida, Georgia, and Alabama. Brimley (1938) listed the species at Southern Pines, North Carolina, hitherto the northeasternmost published locality, and Froeschner (1944) added five counties in Missouri with the comment "A scarce species." Halstead (1972) summarized the range known at that time: "Known from North Carolina south to Florida, thence west through Tennessee to Arizona and Baja California", a statement that generally defines the classical "Lower Austral" biogeographic pattern (the apparently disjunct occurrence of *A. carolina* in Arizona and Mexico may require verification).

Discovery of the species in eastern Virginia has therefore seemed highly probable, and in fact VMNH had material from two lowland localities, taken prior to discovery of the highly unusual site in the central western Alleghanies.

Botetourt Co.: hillside above Rt. 615, 2.8 mi. NE of Oriskany, 18 April 2005, R. L. Hoffman & C. B. Knisley (1♀). *City of Richmond*: Hood's Nursery, 11 September 1933, G. W. Underhill (1♀). *City of Suffolk:* ca. 6 mi. SSE of Franklin, South Quay pine barrens, area 52 pitfall site, 17 June - 1 July 2003, S. M. Roble (1♂, 1♀).

The insect collection at North Carolina State University (NCSU) provided a greatly enhanced perception of the range of *A. carolina* in that state, with specimens from Alexander, Bladen, Iredell, New Hanover, Stanly, Union, and Wake counties in addition to the original record for Southern Pines. South Carolina specimens in the collection at Clemson University are from the western counties of Oconee and Pickens, as well as the coastal Berkeley County, implying a statewide distribution. The same is unquestionably true for Georgia, with the possible exception of two or three northern counties in the Blue Ridge. The range of the species in Virginia and North Carolina is therefore of primary interest at this time.

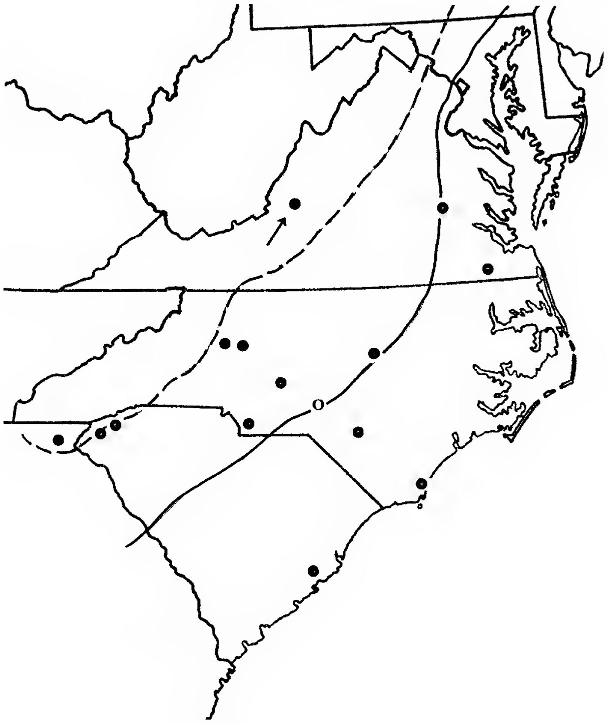

Fig. 1. Central eastern Atlantic region, showing distributional records for *Arhaphe carolina* in the Carolinas and Virginia. The single published record, for Southern Pines, North Carolina, is represented by an open circle. The approximate course of the Fall Line is indicated by the solid line, the eastern edge of the Blue Ridge province by a dashed line.

As indicated on the map (Fig. 1), most of the North Carolina localities are from the Piedmont region, and all are east of the Blue Ridge Escarpment. The paucity of records for the Coastal Plain is noteworthy. The collection site in Richmond, Virginia, is on the Fall Line, and that at South Quay in typical lower Coastal Plain. It is remarkable that *A. carolina* has not been found during extensive sampling in Virginia Beach during the past 15 years.

The population discovered near Oriskany seems clearly to be outside the lowland range to be expected on the basis of other known localities, and is difficult to explain. As the species is brachypterous, as well as decidedly uncommon, it is not a good candidate for the mechanism of aeolian dispersal. The possibility of reliction from a broader Hypsithermal range may be considered, and more recent migration inland via the valleys of the Roanoke River and Craig Creek cannot be discounted. Until more effective ways to collect this scarce bug are devised, knowledge about the details of its distribution may be augmented only slowly.

The subglobose head, color pattern, and quick movements of *Arhaphe carolina* suggest that it may be a facultative mutillid mimic (Fig. 2).

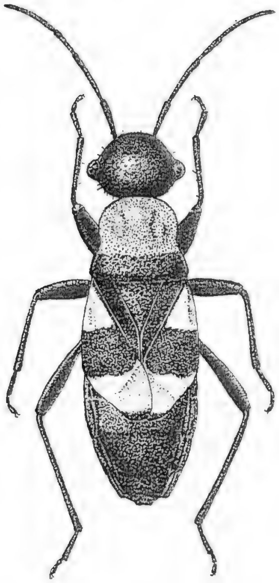

Fig. 2. *Arhaphe carolina*, drawn from a Missouri specimen by Elsie H. Froeschner (from Henry & Froeschner, 1988; used with permission of Department of Entomology, Smithsonian Institution).

ACKNOWLEDGMENTS

Anne C. Chazal (Virginia Department of Conservation and Recreation, Division of Natural Heritage) set the stage for capture of the Oriskany specimen: her discovery there of a specimen of *Cicindela limbalis* instigated a return visit to the site six years later by Dr. Knisley and me. Robert L. Blinn and Alfred G. Wheeler, Jr. kindly provided records for North Carolina and South Carolina, respectively. The Department of Entomology, Smithsonian Institution, granted permission for use of the habitus illustration of *Arhaphe carolina*, which was originally published in *The American Midland Naturalist*, volume 31, 1944.

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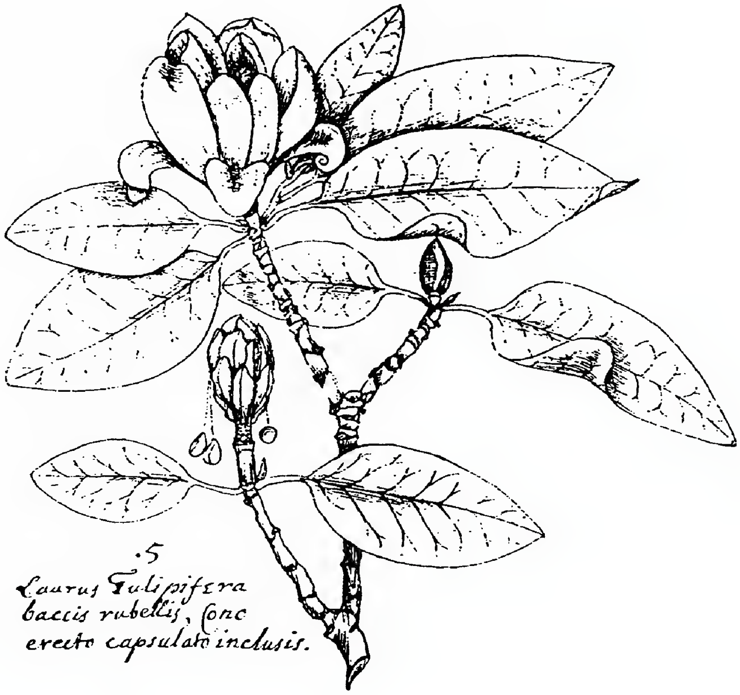

Shorter Contributions

Banisteria, Number 26, 2005

THE PHANTOM DARNER, *TRIACANTHAGYNA TRIFIDA*, A DRAGONFLY NEW TO VIRGINIA--Lord Fairfax Community College operates a spring and fall bird banding station at Little Island Park at the south end of Sandbridge, Virginia Beach. The station is located in coastal strand scrub habitat on the eastern shore of Back Bay adjacent to Back Bay National Wildlife Refuge. During our banding operations we may incidentally catch dragonflies. Students are taught the common species and record their identity as they free the dragonflies from the nets. Any unfamiliar species are brought to the banding tables for identification.

On 2 November 2004, Wendy Willis retrieved a dragonfly from a mist net that we identified as a Phantom Darner (*Triacanthagyna trifida*). The range map in Dunkle (2000) indicates the species is found in southeastern United States with the northernmost occurrence in coastal central North Carolina. The North Carolina Natural Heritage Program has assigned the species an S2 status (imperiled in NC because of rarity or some factor(s) making it very vulnerable to extirpation from NC; 6-20 extant populations) (LeGrand et al., 2004). Outside of Florida, there are very few specimen records of *T. trifida* in the United States (five county records for Georgia, one for South Carolina, and four for North Carolina; Donnelly, 2004; Abbott, 2005; Mauffray & Beaton, 2005). The crepuscular habits of this species may be partially responsible for its apparent rarity.

Our specimen (to be deposited in the Virginia Museum of Natural History) was an adult male caught in net KH2. This site has a row of Bayberry (*Myrica* sp.) and Red Maple (*Acer rubrum*) that are up to 20 feet (6 m) tall. The rest of the vegetation is less than 10 feet (3 m) tall. At the base of the net is a mucky freshwater trough where the standing water can be up to one foot (0.6 m) deep. The species was caught at about 1100 h. Presumably, the darner was flushed from a diurnal roost while the students were tending the mist nets.

This area has proven to be a vagrant trap for birds. Two of the birds banded at the station were species previously unrecorded in Virginia (Black-whiskered Vireo, *Vireo altiloquus* and Western Wood-Pewee, *Contopus sordidulus*). The Black-whiskered Vireo has a southeastern U.S. range somewhat similar to the Phantom Darner (Sibley, 2000). It seemed reasonable to think the darner was merely a wind-assisted individual. However, the winds for the previous day were from the north all morning and east-northeast during the afternoon. There were no previous strong southerly winds which might account for a wind-assisted southern stray.

After returning home, a perusal of our previously unidentified dragonfly photos yielded another *T. trifida* from Little Island. The date on the slide was covered with a label, but because of the film type it had to be taken in 2002 or earlier. This suggests that *T. trifida* may be regular here and possibly a permanent resident. However, the species has not been recorded during Odonata surveys at nearby False Cape State Park (S. M. Roble, pers. comm.). The area at Little Island has been under intense pressure for development. The addition of this species to the already impressive local list of rare flora and fauna will hopefully help to protect this species-rich buffer area for Back Bay National Wildlife Refuge. A special note of thanks goes to Steve Roble and Paul Bedell for their valuable assistance, comments, and verification of *Triacanthagyna trifida*.

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Banisteria, Number 26, 2005

THE OCCURRENCE IN FLORIDA AND VIRGINIA OF *CORIXIDEA MAJOR,* AN EXCEPTIONALLY RARE NORTH AMERICAN BUG (HETEROPTERA: SCHIZOPTERIDAE) -- *Corixidea major* McAtee and Malloch recently has been collected in eastern Virginia, and a specimen from Florida has come to our attention. Although described eighty years ago, this minute insect (length under 1.5 mm) has remained one of the rarest North American heteropterans, previously known only from the unique male holotype found at Clarksville, Tennessee. Our records from Virginia and Florida extend the range of *C. major* just over 1000 km to the east and southeast of the type locality.

Herein, we give two new records from Virginia, and one from Florida based on a specimen discovered (by SMR) in the American Museum of Natural History (AMNH), New York. To facilitate recognition of this species captured by blacklight trap or other static collecting devices, we provide an adult diagnosis and a dorsal habitus drawing (Fig. 1) made from the Zuni, Virginia specimen. The two sketches provided by McAtee & Malloch (1925) are accurate in details of the hemelytral venation and lateral aspect of the head and thorax, but do not convey what the entire animal actually looks like.

New records: FLORIDA: 1♀, *Sumter Co.*: Center Hill, 12 March 1953, no collector data (determined by P. W. Wygodzinsky, AMNH). VIRGINIA: 1♀, *Isle of Wight Co.*: Blackwater Ecological Preserve, 7.4 km SSW of Zuni, UV trap in pine barrens, 4 September 2002, S. M. Roble & C. S. Hobson (Virginia Museum of Natural History [VMNH], Martinsville; identified by TJH by direct comparison with the holotype deposited in the National Museum of Natural History, Washington, D.C.); 1♀, *Northampton Co.*: Savage Neck Dunes Natural Area Preserve, 5 km SW of Eastville, UV trap, 7 July 2004, A. C. Chazal (VMNH, det. RLH).

Diagnosis: The body, including head, pronotum, and scutellum, is generally uniform dark gray, and very finely pubescent; the legs are entirely yellow to pale brown; the eyes are bright crimson. The hemelytral veins, especially of the primary costal cell, are darkly pigmented, as well as the cell itself (in our specimens, the crossvein scarcely visible); other cells are not so darkly shaded. The membrane is a uniform pale dusky brown, without markings; the veins are a diffuse pale brown. The specimen from Zuni is somewhat darker overall, perhaps a little more mature.

Discussion: In general appearance, *C. major* is superficially similar to *Hypselosoma matsumurai* Esaki and Miyamoto (as illustrated by Schuh & Slater, 1995), although the two species are placed in different subfamilies in current classifications (e.g., Emsley, 1969). There is much less resemblance to *Glyptocombus saltator* Heidemann (illustrated by Henry, 1988) and most other species of the consubfamilial genus *Hypselosoma* Reuter, which have predominantly "coleopteriform" or beetlelike hemelytra. Visible external male genitalia (parameres and vesica) of *C. major* are similar to those illustrated for *C. lunigera* (McAtee & Malloch, 1925, fig. 84), the type species of the genus, with only the parameres slightly more thickened and the vesica more slender and coiled (unique holotype not dissected). Slater & Baranowski (1978) keyed the North American Schizopteridae and considered the truncate labium diagnostic for recognizing *C. major*.

Although schizopterids generally are thought to be inhabitants of the soil-litter biotope (Henry, 1988), as *G. saltator* is known to be (Roble & Hoffman, 2000), at least three of the four known specimens of *C. major* were taken at lights, providing little new biological information. With the information and illustration presented in this paper, we hope to alert collectors to the presence of this tiny, enigmatic, and rare resident of the eastern United States.

ACKNOWLEDGMENTS

We thank R. T. Schuh (AMNH) for confirming the sex of and label data for the Florida specimen, and

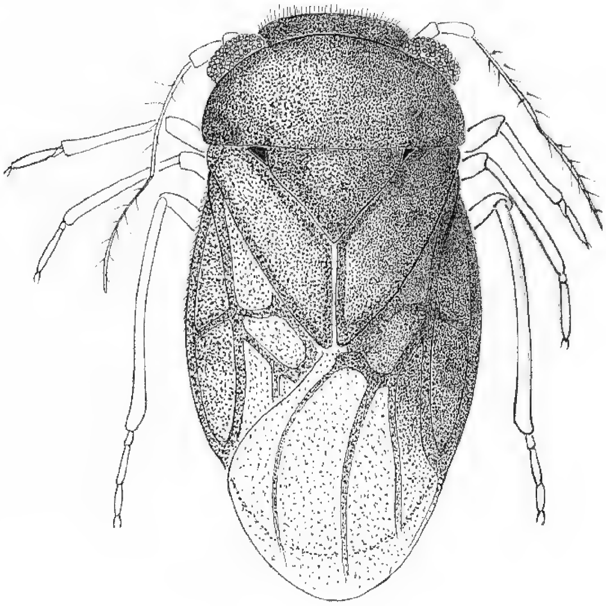

Fig. 1. Dorsal view of female *Corixidea major*.

A. G. Wheeler (Clemson University, Clemson, SC), M. G. Pogue (Systematic Entomology Laboratory [SEL], ARS, USDA, c/o, National Museum Natural History, Washington, D.C.), and N. E. Woodley (SEL) for reviewing a draft of the manuscript.

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Banisteria, Number 26, 2005

EARLY TERRESTRIAL EMERGENCE OF A HATCHLING NORTHERN DIAMOND-BACKED TERRAPIN (*MALACLEMYS TERRAPIN TERRAPIN*) ON THE EASTERN SHORE OF VIRGINIA -- Most of the information available on nest emergence and overwintering of hatchling *Malaclemys t. terrapin* in the mid-Atlantic region suggests that they emerge from the nest in late summer of the same year in which the eggs were deposited (Ernst et al., 1994; Mitchell, 1994). Willem Roosenburg, Russell Burke, Scott Smith, and Paula Henry (pers. comm., April 2005) noted that all of the hatchlings in nests they have observed in Maryland and on Long Island, New York, hatched in the year they were produced. The only published summer nest emergence date in Virginia is 27 August (B. Truitt, *in* Mitchell, 1994). Several other turtles in Virginia have been documented to overwinter in the nest and emerge the following spring (Mitchell, 1994). Here we report an observation of late winter activity of a hatchling Northern Diamond-backed Terrapin on Virginia's Eastern Shore that suggests overwintering in the nest.

At approximately 1000 h EST on 22 March 2005, one of us (PD) found an active hatchling *M. t. terrapin* (Fig. 1) walking along the beach access road on Fisherman Island, Eastern Shore of Virginia/Fisherman Island National Wildlife Refuge, Northampton County, Virginia (37° 05' 52.17" N, 75° 58' 30.82" W). The turtle lacked any growth marks on the carapacial scutes supporting our identification of a hatchling stage (Fig. 1). The weather was sunny that day with a high of 10° C (at time of capture) and a low for the previous night of 0° C. Rain in the previous 24 h was 0.25 cm. PD first saw the turtle's tracks and followed them to the hatchling. No other turtles were seen despite additional searching. Nesting females use this area regularly.

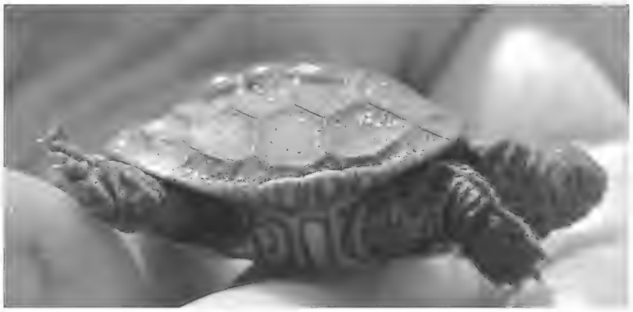

Fig. 1. Hatchling *Malaclemys terrapin terrapin* found on Fisherman Island, Virginia on 22 March 2005.

This observation represents either a late-winter emergence of a hatchling that overwintered in the nest or the emergence of a hatchling that entered a terrestrial overwintering site after emergence from the nest the previous August or September. Either may be correct because Lawler & Musick (1972) described a juvenile with two lines of arrested growth that was overwintering in a dune 0.3 m below the surface in Gloucester County, Virginia. It was found on 7 November 1967, reburied, and emerged naturally on 23 April 1968. Terrapins raised in artificial impoundments in coastal North Carolina at the turn of the 20th century emerged from terrestrial hibernation in March and April (Coker, 1906). The emergence from a terrestrial overwintering site and activity by this hatchling in late March is also significant because it indicates that these small turtles can initiate activity in cool weather. *Malaclemys t. terrapin* is understudied in the Virginia portion of its range. Additional cool weather observations may reveal other unknown aspects of the behavior and ecology of this species.

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Banisteria, Number 26, 2005

WINTER ACTIVITY BY AN EASTERN BOX TURTLE (*TERRAPENE CAROLINA CAROLINA*) IN VIRGINIA -- Lepidosaurian reptiles and turtles normally limit activity in cold weather because they are ectothermic. These animals are usually dormant during winter months in the Northern Hemisphere, but several reports, including some from Virginia, demonstrate that reptiles may be active during cold periods. Mitchell (1994) summarized cold-weather observations on Virginia reptiles published prior to that date. Winter-active reptiles that have been reported since then include an Eastern Wormsnake (*Carphophis amoenus*) by Mitchell & Kirk (1996), a Northern Black Racer (*Coluber constrictor*) by Church & Mitchell (2003), and Eastern Ratsnakes (*Elaphe* [*obsoleta*] *alleganiensis*) by Bulmer & Cherok (1998).

Turtles basking on logs in lakes and ponds are frequently observed on sunny days in the Virginia Coastal Plain when winter temperatures are about 10-16° C (Mitchell, 1994, unpublished). Terrestrial winter activity is far less common for turtles. Mitchell (1994) and Boucher (1999) noted that all activity records known for *Terrapene carolina* in Virginia were from March to December. Drotos (1974) listed an activity period for this species of 5 May to 31 October in Prince William Forest Park in Prince William County. Hunley (1998) reported an Eastern Box Turtle (*T. c. carolina*) active on a college lawn in Roanoke at an air temperature of 10° C on 8 February 1998. This terrestrial turtle becomes inactive during winter months by burying completely or partially under leaf litter and to depths of several cm in the ground (Ernst et al., 1994; Mitchell, 1994; Dodd, 2001). The record depth of 48 cm was in Illinois (Cahn, 1937). In northern states, box turtles can withstand freezing of nearly 58% of their extracellular body fluids for up to 4 days and still recover (Costanzo & Claussen, 1990). Observations of active box turtles at cold temperatures are of interest because they show the range of environmental conditions within which these reptiles may be active in winter. This note describes a turtle found completely exposed at freezing temperatures in southeastern Virginia.

On 11 February 2005, I observed an adult male *T. c. carolina* sitting in the open on the ground with head and limbs partially retracted into its shell at 1045 h EST at a site about 5.0 km NNE Rushmere, Isle of Wight County, Virginia (37° 06' 37.29" N, 76° 39' 56.64" W).

The habitat was a small clearing in mixed 10-12 year old Loblolly Pine (*Pinus taeda*) and young hardwoods. The turtle was completely exposed to the ambient environment sitting on bare soil next to a small clump of grass. Air temperature when it was found was 1.7° C (EnviroSafe field and lab thermometer, Forestry Suppliers, Inc.). I hypothesized that this turtle had been active near his hibernaculum on 8 or 9 February when air temperatures approached the low 20s °C in this area. He may have been in the open away from cover when the temperatures dropped to below about 4-5° C at night. Air temperatures on the morning of 11 February dropped below freezing (-2.2° to -1.1° C); a thin layer of ice was on a shallow pool of water in a road rut about 30 m away. The turtle was alert, appeared healthy, and lacked any nasal discharge; withdrawal of its legs and head into the shell did not produce any audible wheezing or visible bubbles from the nose. I subsequently moved the turtle to cover beneath a layer of leaf litter.

Natural emergence from hibernacula in Mason Neck National Wildlife Refuge in Fairfax County, Virginia, for males was from 21 March to 5 April and females from 6 March to 11 April (Boucher, 1999). He noted that some turtles were alert during hibernation and that cloacal temperatures ten days prior to emergence were 3.8-13.2° C. The lowest hibernaculum temperature he recorded was 2.5° C; soil temperatures were 2.5 to 12.8° C upon emergence. Boucher (1999) did not note winter mortality but Allard (1948) observed box turtles from Virginia and Maryland that were occasionally killed by sudden freezes in winter and late spring.

My observation suggests that *T. c. carolina* can withstand being exposed to freezing temperatures in southeastern Virginia. Eastern Box Turtles from Virginia may have a freeze tolerance similar to that reported for *Terrapene* in the upper Midwest (Costanzo & Claussen, 1990; Costanzo *et al*., 1993).

ACKNOWLEDGMENTS

I thank Ken Dodd and Steve Roble for their comments on a draft of this manuscript.

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Banisteria, Number 26, 2005

ABERRANT COLOR AND PATTERN IN A NORTHERN TWO-LINED SALAMANDER (*EURYCEA BISLINEATA*) FROM VIRGINIA -- Unusual color and pattern phenotypes have been reported occasionally for several species of salamanders in Virginia. These include, for example, an albinistic *Plethodon hubrichti* (Hayslett et al., 1998), leucistic *Ambystoma opacum* (Mitchell & Church, 2002) and *Desmognathus fuscus* (Mitchell, 2002), and a red translucent *Plethodon cinereus* (Mitchell et al., 2003). Reports such as these provide additional information on phenotypic and genetic variation in Virginia populations.

On 6 April 2005, I found an adult, gravid female *Eurycea bislineata* in a small rocky stream on Fort Belvoir, Fairfax County, Virginia that had an aberrant color and pattern phenotype. The exact location is not provided due to security restrictions. The stream was deeply cut through the wooded slope, and it and the surrounding trees (e.g., Red Cedar [*Juniperus virginiana*], Virginia Pine [*Pinus virginiana*]) suggested that this area was once an open agricultural field or pasture. Currently, the slope that drains into this small stream is forested with Tulip Tree (*Liriodendron tulipifera*), White Oak (*Quercus alba*), and Loblolly Pine (*Pinus taeda*). Industrial and military complexes occur in the watershed, as do urban roads. During two surveys in this stream I found only one other *E. bislineata*; it had the typical color and pattern. I also observed several adult and juvenile *Rana clamitans* and *Rana palustris*. One juvenile for each of these two species was found dead.

Normally colored *E. bislineata* adults have an orange-yellow to yellow-brown dorsum bordered on each side dorsolaterally with a narrow dark brown to black line, a yellowish head sometimes with black flecks, and immaculate yellow chin, venter, and undersides of all legs (Bishop, 1947; Conant & Collins, 1991; Petranka, 1998). The dorsolateral black stripes extend from behind the eyes to the distal portion of the tail. In some areas, the black lines on the tail may be broken into irregular spots (Martof et al., 1980). The midline of the yellow dorsal band has small, irregular black flecks in many individuals in Virginia (Mitchell, 2000). The sides are mottled yellowish-brown fading from darkest near the black dorsolateral lines to immaculate yellow near the venter (Bishop, 1947). The legs are yellowish-brown and may or may not have black flecking, especially on the rear legs.

The aberrant female (47 mm SVL, 29 mm partial tail length) lacked the dorsal yellow band and black stripes (Fig. 1). The dorsum of the head, neck, body, tail, and both pairs of limbs were largely dark brown. Except for the nearly uniform brown dorsum on the body, much of this pattern was mottled. The mottling in the lateral fields between the legs was black and formed irregular black spots or patches The chin and venter of the neck, body, tail, and limbs were dull yellow in life, confirming its identity as an *E. bislineata* in this area.

Discussion of the etiology and significance of this aberrant color and pattern in the urbanized and degraded stream would only be speculation. We do not know if human-derived stressors have any direct or indirect effects on salamander phenotypes. However, reports of all such variants should be published in the event that the underlying cause of such color and patterns can be elucidated in the future.

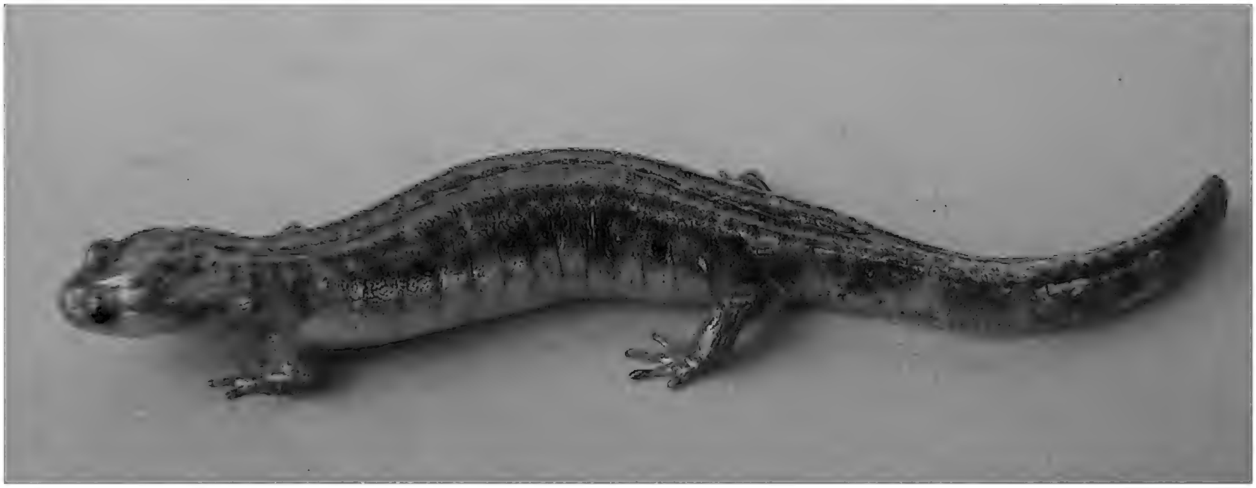

Fig. 1. Aberrant female *Eurycea bislineata* from Fairfax County, Virginia.

ACKNOWLEDGMENTS

I thank Bill Kirby at Pacuilli Simmons & Associates for a contract to work on this site.

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Banisteria, Number 26, 2005

INVERTEBRATE PREDATION ON A MARBLED SALAMANDER (*AMBYSTOMA OPACUM*) LARVA IN VIRGINIA -- Predation by aquatic invertebrates and their larvae on amphibian larvae has been reported by many authors (e.g., Hinshaw & Sullivan, 1990; Mitchell, 1990; Rogers, 1996; Owen & Johnson, 1997; McCoy, 2003). Most reports describe spider or insect predation on tadpoles. Several papers describe the effects of the presence of diving beetle larvae on larval amphibian morphology, behavior, and community structure (Bosi, 2001; Laurila et al., 2001; Altwegg, 2003; Johnson et al., 2003). Anecdotal observations can be important because accumulation of such data may lead to a better understanding of the range of predators on different amphibian life history stages and their survival risks in different habitats. Predators and their prey may vary in different parts of the species' range. Invertebrate predation on salamander larvae has been reported, for example, for Spotted Salamander (*Ambystoma maculatum*) larvae in Connecticut (Kenny & Burne, 2000) and for a Red-backed Salamander (*Plethodon cinereus*) by a rove beetle in Maryland (Jung et al., 2000). In this note, we provide the first published report in Virginia on a Marbled Salamander larva depredated by a predaceous aquatic beetle larva.

On 15 May 1998, we collected six near-metamorphic *Ambystoma opacum* larvae in a small pond on Fort A.P. Hill, 6.8 km SW Port Royal, Caroline County, Virginia (38° 08' 40.76" N, 77° 16' 7.52" W). All were large (50-56 mm total length, 0.87-1.24 g) and all but one had external gills. We initially found one of the gilled larvae (52 mm total length, 1.10 g) upside down in the water. Upon capture, we discovered a larva that was being eaten by a water tiger, the larval form of a predaceous diving beetle (*Cybister* or *Dytiscus*, Dytiscidae). We also caught 30 Spotted Salamander (*Ambystoma maculatum*) larvae, tadpoles of the Spring Peeper (*Pseudacris crucifer*) and Southern Leopard Frog (*Rana sphenocephala utricularia*), and adult Red-spotted Newts (*Notophthalmus viridescens*) in the same pond. The two ranid tadpoles (72 mm and 89 mm total length) and the adult newts were likely too large for the water tiger, although the others were small enough to be captured by this predator. The *A. maculatum*, *A. opacum*, and *P. crucifer* larvae were at some level of risk of predation by this aquatic predator. We recommend that all observations of invertebrate predation of amphibians and reptiles in Virginia be described in detail, including identification of the predator.

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Banisteria, Number 26, 2005

ARBOREALITY IN A NORTHERN BROWNSNAKE (*STORERIA DEKAYI DEKAYI*) IN VIRGINIA -- North American snakes are often grouped according to their generalized habitat type, such as aquatic, semiaquatic, terrestrial, and arboreal. Not all snakes adhere to these human constructs, however, as several species that have been considered primarily terrestrial have been found well off the ground in vegetation. Arboreal behavior has been documented in Black Racers (*Coluber constrictor*), Timber Rattlesnakes (*Crotalus horridus*), Copperheads (*Agkistrodon contortrix*), western Gartersnakes (*Thamnophis* spp.), and Crowned Snakes (*Tantilla* spp.) in the modern literature (Liner & Chaney, 1990; Saenz et al., 1996; Mitchell et al., 2000; Beaupre & Roberts, 2001; Fogell et al., 2002; Leenders, 2004; Sajdak & Bartz, 2004). Observations of such behavior provide insights into the life histories and ecology of these snakes that occasionally cause us to rewrite our books.

Arboreality in the Northern Brownsnake (*S. dekayi*) has been documented three times; all in North Carolina. One was observed apparently basking about 1.4 m above ground in a hedge and another was coiled 61 cm above ground in a sapling (Palmer & Braswell, 1995). Brown (1992) noted that gravid females are sometimes found in branches and vines overhanging streams. Hunley (2003) found one of these snakes basking on a mound of soil on 21 March in Botetourt County, Virginia.

On 7 May 2005, one of us (PP) observed a female *S. dekayi* (246 mm TL) lying on a Japanese Honeysuckle (*Lonicera japonica*) vine about 44 cm above ground in full sun, 3.1 km SW of the Danville Regional Airport in the City of Danville, Virginia (36^{o} 33' 35.4" N, 79^{o} 21' 22.6" W, elevation 111 m). This vine was located beside a mountain bike trail cut through a mature oak-hickory forest. The trail allowed sufficient light through the canopy to sustain an herbaceous layer composed

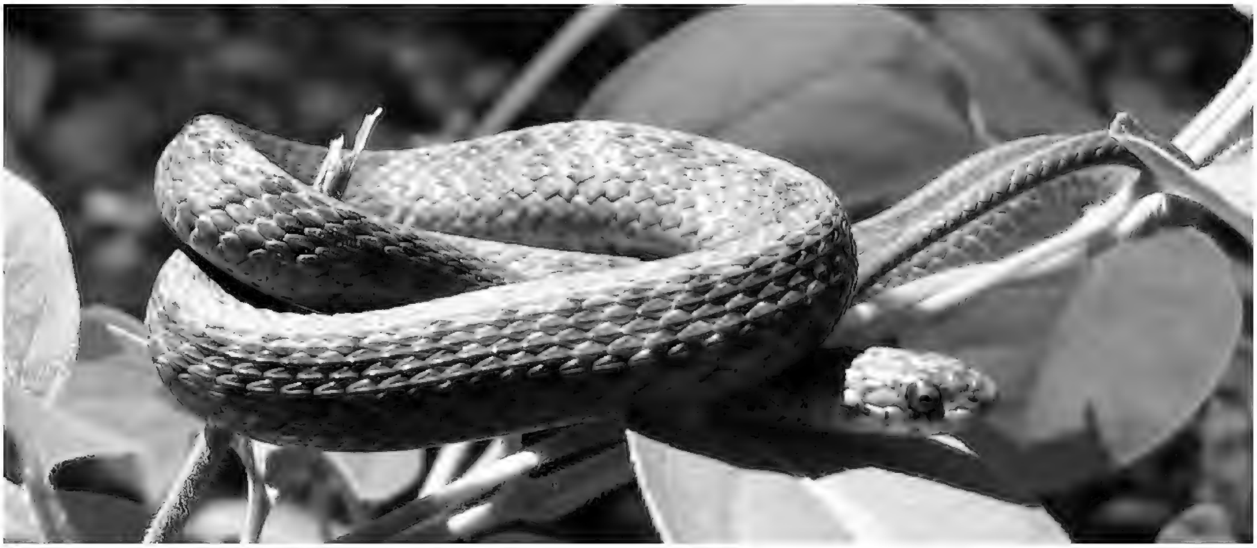

Fig. 1. Northern Brownsnake basking on *Lonicera japonica* in the City of Danville, Virginia. Photo by J. Gibson.

of *L. japonica*, *Rubus* sp. (Blackberry), *Vitis* sp. (Grapevine), *Toxicodendron radicans* (Poison Ivy), and *Galium aparine* (Bedstraw). The snake appeared to be basking, an arboreal behavior consistent with that described by Brown (1992). While taking photographs of the snake (Fig. 1), it tongue flicked many times but exhibited no other behaviors. It quickly entered the leaf litter when placed on the ground. Reports and descriptions of arboreality in terrestrial snakes are potentially useful because they provide insights into little known behaviors of these secretive animals.

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Banisteria, Number 26, 2005

SOUTHERN RING-NECKED SNAKE (*DIADOPHIS PUNCTATUS PUNCTATUS*) PHENOTYPE IN THE BLUE RIDGE PHYSIOGRAPHIC PROVINCE OF VIRGINIA -- Ring-necked Snakes (*Diadophis punctatus*) are distributed broadly in North America, ranging from Nova Scotia to Florida and coast to coast (Wright & Wright, 1957; Ernst & Ernst, 2003). There are twelve currently-recognized subspecies (Crother, 2000), of which two, the Southern Ring-necked Snake (*D. p. punctatus*) and the Northern Ring-necked Snake (*D. p. edwardsii*), occur in Virginia (Mitchell, 1994). The putative intergrade zone of these two phenotypes in the state is broad, extending in a southwest to northeast zone from Pittsylvania to Greensville counties along the Virginia-North Carolina line to Hanover to Accomack counties (Blem & Roeding, 1983; Mitchell & Reay, 1999). South of this zone, Southern Ring-necked Snakes have a midventral row of large black spots, a broken neck collar, and small black spots on the supralabial and infralabial scales. North of this zone, Northern Ring-necked Snakes lack large, black ventral spots, are usually immaculate or have a variable number of small spots on the venter, and have a complete neck collar and no labial spotting. Intergrades have combinations of these characters and modified characters, such as a neck collar constricted at the midline but not completely broken. Higher frequencies of snakes on the fringes of the putative intergrade zone exhibit the phenotypes of the nearest subspecies. It was thus of considerable interest when we discovered a snake outside the known intergrade zone well to the west that had characters more akin to the southern subspecies than the expected northern subspecies. We describe this snake here and comment on the geography of the intergrade zone in Virginia.

On 1 August 2003, one of us (WDB) caught an adult male *D. punctatus* (213 mm snout-vent length, 55 mm tail length, 4.6 g) 5.2 km NW Stanardsville, Greene County, Virginia (UTM 17s 0719511 E, 4246647 N, NAD 83) that possessed characters more typical of *D. p. punctatus* than *D. p. edwardsii*. It was found on leaf litter under a loose rock in a mixed hardwood/pine forest with White Pine (*Pinus strobus*) and Chestnut Oak (*Quercus prinus*) dominating the canopy and Mountain Laurel (*Kalmia latifolia*) in the understory. The snake was photographed and released at the capture site.

The snake was uniform slate gray dorsally on the head, body, and tail with a yellow neck collar that was constricted along the midline (Fig. 1). The chin was white and the venter was orange with black half-moon shaped spots on the midline of all of the ventral scales except for the anteriormost six scales. A small black spot occurred on each of the two posterior infralabials on each side of the head, as well as one on the anteriormost infralabial on the left side. Number of ventrals was 157 and number of subcaudals was 53, counts well within the range reported by Mitchell (1994) for this area. Three additional specimens found in the same location since the discovery of this animal had immaculate venters, complete collars, and no labial spotting. A total of 27.7% of the snakes in the southern Coastal Plain sample examined by Mitchell (1994) and considered to be true *D. p. punctatus*, had constricted collars. In contrast, only 3.8% of the snakes in the lower Piedmont had constricted collars and all of the snakes examined from north of this area had complete collars. The characters noted above align this snake with those found along the southern margin of the intergrade zone approximately 165 km to the southeast or well into southeastern Virginia. It represents an unusual phenotype for this species in the Blue Ridge Physiographic Province of Virginia.

The intergrade zone between the two eastern subspecies of *D. punctatus* in Virginia has not been precisely elucidated. An initial evaluation of these snakes in the Southeast (Paul, 1967) used only two samples from Virginia, one from the southeastern corner and another from the southwestern Piedmont. He noted that specimens with heavy mid-ventral spotting, the most consistent character to delineate the range of *D. p. punctatus*, occurred in the lower mountains of Georgia and North Carolina. Blem & Roeding (1983) stated that only populations in the extreme southeastern corner of Virginia are true *D. p. punctatus*, and snakes they labeled as intergrades ranged from a line extending from Hanover County to Mecklenburg County southeast to the cities of Chesapeake and Virginia Beach. Their westernmost population with heavy ventral spotting was in Mecklenburg County. Tobey (1985) stated that intergrades occurred in a broad region between the "real typical southern form in the Norfolk area and the typical northern form in the Blue Ridge." Using specimens assigned to one subspecies or the other and comments on intergrade variation in Mitchell (1994), Mitchell & Reay (1999) delineated an intergrade zone band that curved to the northeast from the southern Piedmont counties to the counties in the lower Coastal Plain along the Potomac River and Accomack County on the Eastern Shore. Finally, Palmer & Braswell (1995) illustrated an intergrade zone in North Carolina that covered the entire Piedmont region and portions of

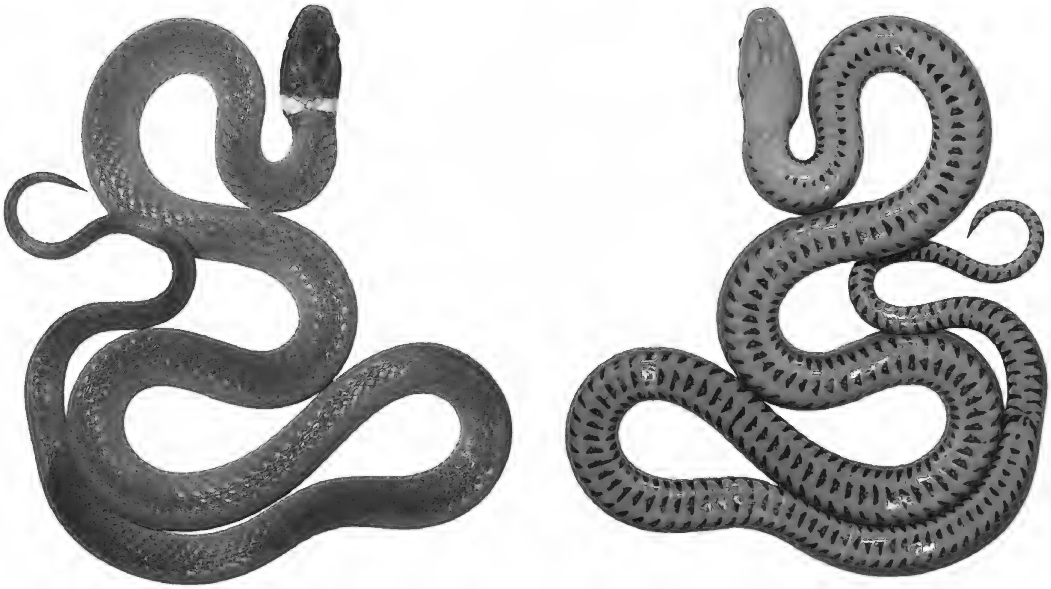

Fig. 1. Dorsal and ventral views of a *Diadophis punctatus* from Greene County, Virginia. Photos by Will Brown.

the upper Coastal Plain. The intergrade zone in Mitchell & Reay (1999) provides the closest match to that known in North Carolina. Unfortunately, we lack specimens from some of the areas along the western portion of this putative intergrade zone and thus are still unable to precisely describe its geographic location and shape. The discovery of a *D. p. punctatus* phenotype from Greene County suggests that considerable additional investigation is needed to reach this goal for Ring-necked Snakes in Virginia.

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Miscellanea

Reviews

Under a Wild Sky: John James Audubon and the Making of *The Birds of America* by William Souder. 2004. North Point Press, New York. 367 pp. $25.00 (cloth), $16.00 (paper).

If you have never read about Audubon's life, this is the book for you. It is a highly detailed account of everything (and more) that you ever wanted to know about this most acclaimed bird artist of the 19th century. Using hundreds of library documents and other sources, the author skillfully weaves together the life events of Audubon from his birth through all the tribulations of "making of The Birds of America." In this book, we learn the details of Audubon's travels (from Europe to Labrador to Florida), hardships and personal tragedies, and difficulties in publication. Driven by his goal to paint every American bird in life size and sell the pictures, Audubon's life was fraught with sickness, adverse weather, depression, business failures, unstable finances, and family separation.

From the original bird paintings in woodlands and swamps of eastern North America to the final engravings abroad, Audubon as a rough-cut woodsman-artist constantly sought to make a name for himself at all odds. And not just in the quality of his massive drawings. He also attempted to break into the scientific snobbery at long-standing institutions such as the venerable Philadelphia Academy of Natural Sciences. Here, for example, his paintings were severely criticized by some senior ornithologists who firmly believed that Alexander Wilson's drawings were far superior. Despite these attempts to demean Audubon's reputation and work in North America, it is interesting to note that his fame was initially obtained abroad.

As the number of completed sets for subscribers increased, Audubon and his associates realized that something was missing. The huge magnificent paintings alone did not adequately express the "character" of the bird as Audubon had experienced in the wild. Thus was born his Ornithological Biography, companion texts about the bird's habits taken chiefly, but not entirely, from his journals. Here, one finds many fantastic if not unbelievable tales, such as rattlesnakes in trees, shooting through a candle flame without extinguishing it, or prowling the Kentucky woods with Daniel Boone. Furthermore, the double-elephant folios were difficult to transport and sell, so with a kind of "camera lucida" the large prints were reduced in size and price (hence the "octavo edition").

A few matters caught my attention. With his own language, the author liberally and personally interpreted Audubon's feelings "volatile mood," "ducks that made his blood hot," and "open vistas that Audubon found dull." I was surprised and disappointed not to find an extensive account of Audubon's southerly trips in the 1830s and 1840s, much of which is found in Martin's (1980) little book. Also, it appears that much more could have been written about his Florida adventures.

Even so, I could hardly put the book down, being enticed by the author to Audubon's next round of adventures.

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Reports

1. President's Report

The Virginia Natural History Society was founded in 1992 with the goal of "promoting the study of all aspects of Natural History of Virginia to educate the citizens of the Commonwealth about natural history and to conserve its natural resources." [VNHS Articles of Incorporation and Bylaws, *Banisteria*, no. 2, 1993]. At the Executive Committee meeting on December 10, 2005, we discussed the ways in which the Society has succeeded and the challenges that remain. *Banisteria* has been published successfully since the society began, and most members join in order to receive and publish in that journal. However, lack of knowledge of the society, both within Virginia and beyond, is still a challenge. Another is that even those who know of the VNHS may not realize that by "Natural History" the society's organizers meant to include all of the scientific disciplines that Virginia's first university-trained naturalist, John Banister (1650-1692), would have considered natural history: archeology, anthropology, botany, ecology, zoology, paleontology, geology, geography, and climatology. Recruiting members and manuscripts from more disciplines is important if the journal is to thrive.

We also noted that a number of people join the society for a year and then do not renew their memberships—perhaps they expected more of VNHS than *Banisteria.* Other state- or province-wide natural history societies sponsor a range of activities, from single day field trips to yearly conferences and weekend to weeklong field sessions and camps. This year VNHS is contributing funds to help sponsor the 2006 Potomac Gorge BioBlitz being organized by VNHS Councilor Arthur Evans. We also discussed the possibility of a "Virginia Natural History Conference" for 2007. Webmaster John White maintains the VNHS website and can add new information to the site as it is submitted. Developing the website to link to the other natural history-related organizations and events in the state and region is another priority for 2006.

Sincerely,
Judith E. Winston, President
Virginia Museum of Natural History

2. Secretary/Treasurer's Report

We have 130 members for 2005, 16 of which are institutions or libraries. This compares unfavorably with our final membership for 2004 of 165 members, of which 21 were institutions. Our treasury presently holds $3,017.83.

As always, we encourage our active members to recruit members for the Society. **Two membership forms are included with this mailing.** Please renew your own membership for 2006 and pass the second copy of the form on to a friend or colleague interested in the natural history of our state.

A **ballot for the election of a new councilor is also included with this mailing**. Please return it to me by April 15, 2006.

We continue to be grateful to Hampden-Sydney College for support with the paperwork concerning our treasury and membership records.

Please submit all enquiries about membership in the Society or about past issues of *Banisteria* to: Dr. Anne Lund, Virginia Natural History Society, Box 62, Hampden-Sydney, Virginia 23943, or email, **alund@hsc.edu**.

Respectfully submitted,
Anne Lund, Secretary/Treasurer

3. Webmaster's Report

Most of the major work on the website this year has involved developing pages for the 2006 Potomac Gorge BioBlitz in cooperation with Art Evans and Stephanie Flack, coordinators of the survey. The website contains the titles of all papers that have been published in *Banisteria* (numbers 1-25) and includes abstracts (in downloadable pdf format) of all full-length articles published since 2004. The static graphic on the main page has been replaced with a photo slide show of native flora and fauna. As of December 19, 2005, the website hit counter displays 2,641 hits.

John White, Webmaster

4. Coeditors' Report

This issue of *Banisteria* is somewhat smaller than others in our recent past. There are two reasons for this: increasing printing costs and insufficient manuscript submissions. Each copy of the previous issue of *Banisteria* (number 25) cost $10 to print, a substantial increase from past years. With postage, this amounts to more than half of the basic annual membership fee of $20. Consequently, we decided it was necessary to produce a smaller second issue to avoid a budget deficit for 2005. We will investigate other options for less expensive but high quality printing for future issues of the journal. A limited number of manuscript submissions in 2005 is also responsible for the smaller size of this issue of *Banisteria.* This journal would not survive were it not for the efforts of several colleagues, notably Dr. Richard Hoffman, and the co-editors. We cannot continue to keep this journal afloat by ourselves. We are working hard to get our journal back on track with two issues a year, one in Spring and another in Fall. The only way we can do that is to have enough manuscripts on hand to fill an issue. Currently, we do not have an adequate number of submissions for the next issue. Therefore, to prevent delays in the publication of that issue, please dust off those old data sets, pull unpublished theses off the shelves, and work with your students to produce manuscripts. And get out in the field to make observations on Virginia's natural history. It is all about communicating what you have learned about these topics.

An important decision made at the Executive Committee meeting on December 10, 2005, was to make it known that *Banisteria* will accept manuscripts on any aspect of natural history from neighboring states as long as the information concerns a species native to Virginia or the topic is directly related to regional archeology, anthropology, botany, ecology, zoology, paleontology, geology, geography, and climatology. Please pass this information along to colleagues in our neighboring states.

We thank Will Brown for allowing us to use his exquisite pen and ink drawing on the outside back cover of this issue. Will's illustrations are welcomed additions to *Banisteria*.

John White, our able Webmaster, regularly updates the *Banisteria* table of contents page, including abstracts and keywords for all full-length articles published in 2004 and later. In 2006, we will provide him with downloadable pdf files of selected papers from earlier issues for posting on the website. We will also post color versions of a selection of photographs originally published in black and white in *Banisteria* due to cost restrictions. We thank John for his dedication to the society and his help with our website.

Respectfully submitted,
Joe Mitchell and Steve Roble, Co-editors

5. Natural History and Biodiversity Section of the Virginia Academy of Science

The Natural History and Biodiversity Section of the Virginia Academy of Science (VAS) met on May 19, 2005, at James Madison University, Harrisonburg, Virginia. This section was initiated in 1993 by key leaders of the Virginia Natural History Society (VNHS) so that our group would have a place to meet. Unfortunately, the VAS has a policy that does not allow joint meetings with other societies. The VNHS conducted an annual business meeting during lunch at these meetings in the early years but attendance was always low. Given the low attendance and lack of recognition, the VNHS officers decided recently that we would no longer be associated with the Natural History and Biodiversity Section of the VAS. Thus, this list of papers presented at this VAS section is the last to be printed in *Banisteria*. Eleven papers were presented at the VAS meeting.

Oral Presentations:

Life-history characteristics of the Atlantic Pigtoe, *Fusconaia masoni*. J. M. Rash & R. J. Neves.

A new species of silverfish (Insecta: Nicoletiidae) from a Mexican cave. A. F. Fisher, I. J. Rishmawi, & L. Espinosa.

Assessment of some biological and conservation parameters in a small population of Saguaros, Coronado National Forest, AZ. L.H. Gray, J.J. Przybyla, and L. Espinosa.

Long-distance dispersal movements of bog turtles. K. K. Fleming, C. A. Haas, S. L. Carter, & M. J. Pinder.

A graph theoretic analysis of the relationship between global lingual structures and human genetic structures. T. Yu.

Status of introduced *Sarracenia purpurea* L. sites in Maryland and Virginia with comments on pitcher plant conservation. P. Sheridan & R. Duffield.

The efficacy of visual encounter surveys for population monitoring of *Plethodon punctatus* (Caudata: Plethodontidae). W. D. Flint & R. N. Harris.

A new biosphere preserve in Virginia, the Joseph Pines Preserve. P. Sheridan.

Identification of suitable host fishes for the endangered Cumberland Elktoe freshwater mussel (*Alasmidonta atropurpurea*) (Unionidae: Bivalva). J.A. Guyot and R.J. Neves.

Stumped, the challenge of identifying dendroliths. P. Sheridan, T. L Eberhardt, J. Mahfouz, & C. So.

The 2004 Virginia Society of Ornithology breeding bird foray on the Northern Neck of Virginia. A. S. Dolby & S. Spencer.

Posters:

Determining a suitable substrate size and sampling frequency for rearing juvenile freshwater mussels (Bivalvia: Unionidae). A. J. Liberty & R. J. Neves.

Growth of captive-bred tarantulas, *Pterinochilus murinus*, on three different diets. R. S. Mays, D. P. Miller, & C. M. Neal.

Announcements

1. Membership Renewals and Election Ballot

Membership in the Virginia Natural History Society is on a calendar year basis. A membership renewal form for 2006 is included with this issue for your convenience. Also, the society needs to elect a new councilor for a four-year term to replace Paul Bedell, as his term (2001-2005) expires in December. We thank Paul for his service to the society. Please return your membership renewal form and election ballot by **April 15, 2006** to Dr. Anne Lund, Virginia Natural History Society, Box 62, Hampden-Sydney, Virginia 23943.

2. 2006 Potomac Gorge BioBlitz

The Potomac Gorge BioBlitz will be held on June 23-25, 2006. The BioBlitz is a joint venture between the National Park Service and The Nature Conservancy to document fungi, non-flowering plants, invertebrates, amphibians, and reptiles on NPS lands. Survey sites along the Potomac River in Virginia, Maryland, and the District of Columbia include Great Falls National Park, Turkey Run Park, and the Chesapeake & Ohio Canal National Historical Park.

The BioBlitz is an intensive 30-hour field survey that will begin at 9 AM on Saturday, June 24 and end at 3 PM on Sunday, June 25. The base camp for the event will be located in the heart of the Gorge at the historic Glen Echo Park in Glen Echo, Maryland. Survey teams will have the option to spend Friday and Saturday nights here and set up specimen preparation and identification labs. Meals (Friday dinner through Sunday lunch) will be provided to all participants.

The results of the survey will be published in *Banisteria*. The data will also be entered into a National Park Service database to maximize information sharing in the natural history community and to promote effective park natural resource management.

If you or someone you know would like to take part in the Potomac Gorge BioBlitz, please visit the web site at **http://fwie.fw.vt.edu/vnhs/bioblitz.htm** or contact Dr. Art Evans at **arthurevans@verizon.net**. Dr. Evans coordinated the first two Virginia BioBlitz events. Stephanie Flack (**sflack@tnc.org**, 301-897-8570), Potomac Gorge Project Director for The Nature Conservancy of Maryland/D.C. is the co-coordinator of the 2006 BioBlitz.

The 2006 Potomac Gorge Bioblitz is sponsored by The Nature Conservancy, National Park Service, Washington Biologists' Field Club, Virginia Natural History Society, Virginia Herpetological Society, Discovery Creek Children's Museum, and Glen Echo Partnership for Arts and Culture.

3. Digital Atlas of the Virginia Flora

The Virginia Botanical Associates have created a Digital Atlas of the Virginia Flora, now available on-line at **http://www.biol.vt.edu/digital_atlas/**. The Digital Atlas is a valuable resource on Virginia's flora that includes county range maps for just over 3,700 taxa. Numerous infraspecific taxa not mapped in the Atlas of the Virginia Flora, 3rd Edition (1992), are included, as well as species only listed in the appendix. These, along with a surprising number of additions to the flora, comprise about 700 species, subspecies, and varieties. For some of these additional taxa, maps are incomplete or lacking pending the reexamination of herbarium specimens. The user can search by scientific name (enter genus or species names) or browse by family. Clicking on the "Browse Genus" button pulls up an alphabetical listing of all taxa included in the Digital Atlas, from which any species can then be selected. The digital format will allow for continual updating of distributional records, taxonomy, and nomenclature.

The "Comments" field for each taxon is used to report its status in Virginia, especially where uncertainty exists. For many taxa, this field also contains information on taxonomic issues, phytogeographic facts, literature citations, and other tidbits of general interest. The "Habitat" field is populated for some taxa. Goals of the Digital Atlas are to provide up-to-date information on the state's flora to the Flora of Virginia Project and contributing authors of Flora North America, and to spur botanists and other naturalists to conduct their own investigations, resulting in new and better information about Virginia's flora. Comments, corrections, new data, and any other thoughts should be sent to Tom Wieboldt, Massey Herbarium, Virginia Tech, Blacksburg, VA 24061 (phone: (540) 231-5746; e-mail: **wieboldt@vt.edu**).

4. Virginia Society of Naturalists

The Virginia Society of Naturalists, founded in October 2005, meets on the third Tuesday night of the month, September through May, in the Discovery Room at the Science Museum of Virginia, 2500 W. Broad Street, Richmond. This organization encourages "cross-pollination" among scientists, educators, students, and naturalists. Each meeting features a lecture on the natural history of Virginia and beyond. Members and guests are encouraged to share photographs, literature, and observations before the program.

Membership to the *Virginia Society of Naturalists* is open to all. Regular membership is $25 and family memberships are $30. Make checks payable to: Virginia Society of Naturalists, c/o Sandra Erdle, P.O. Box 4614, Glen Allen, VA 23058-4614. For information about upcoming meetings, summer field trips, and other events visit the society's website at **www.VirginiaNaturalists.org**, or contact Art Evans at **arthurevans@verizon.net**.

5. A plea for information

Members of the VNHS are encouraged to submit information on upcoming events on any topic related to natural history in Virginia. Please submit information on event, place, time, and contact information to one or both of the co-editors.

6. Recent Publications

Mushrooms of West Virginia and the Central Appalachians by William C. Roody. 2003. University Press of Kentucky. 520 pp. $60.00 (cloth), $35.00 (paper). Contains color photos and descriptions of about 400 species; additional species are discussed in the text.

Mammals of North America by Nora Bowers, Rick Bowers, & Kenn Kaufman. 2004. Kaufman Focus Guides, Houghton Mifflin Co. 352 pp. $30.00 (cloth), $22.00 (paper). Includes more than 1,200 color photos.

A Field Guide to North Atlantic Wildlife: Marine Mammals, Seabirds, Fish and Other Sea Life by Noble S. Proctor & Patrick J. Lynch. 2005. Yale University Press. 221 pp. $19.95 (paper). Includes more than 100 color plates (paintings) of more than 300 species.

The Sibley Field Guide to Birds of Eastern North America by David Allen Sibley. 2003. Alfred A. Knopf. 433 pp. $19.95 (paper). Contains more than 4,000 illustrations of 650 species by the author.

Shorebirds of North America: The Photographic Guide by Dennis Paulson. 2005. Princeton University Press. 361 pp. $65.00 (cloth), $29.95 (paper). First book to treat all shorebird species of North & Central America.

Raptors of Eastern North America: The Wheeler Guides by Brian K. Wheeler. 2003. Princeton University Press. 437 pp. $45.00 (cloth). Includes hundreds of color photos; for more advanced observers.

Butterflies of the East Coast: An Observer's Guide by Rick Cech & Guy Tudor. 2005. Princeton University Press. 345 pp. $49.50 (cloth). Features 234 detailed species accounts and 950 color photos.

Butterflies of North America by Jim P. Brock & Kenn Kaufman. 2003. Kaufman Focus Guides, Houghton Mifflin Co. 384 pp. $30.00 (cloth), $22.00 (paper). Includes more than 2,300 color photos.

Caterpillars in the Field and Garden: A Field Guide to the Butterfly Caterpillars of North America by Thomas J. Allen, Jim P. Brock, & Jeffrey Glassberg. 2005. Oxford University Press. 232 pp. $49.50 (cloth), $29.95 (paper). Includes more than 900 color photos of butterfly caterpillars (plus 34 moth caterpillars).

Caterpillars of Eastern North America by David L. Wagner. 2005. Princeton University Press. 512 pp. $60.00 (cloth), $29.95 (paper). Includes more than 1,200 color photos of the caterpillars and adults of nearly 400 species (mostly moths; many are illustrated for the first time) and descriptions of 300 more.

A Field Guide to the Tiger Beetles of the United States and Canada: Identification, Natural History, and Distribution of the Cicindelidae by David L. Pearson, C. Barry Knisley, & Charles J. Kazilek. 2005. Oxford University Press. 227 pp. $79.00 (cloth), $24.95 (paper). This color-illustrated field guide treats all 109 species of tiger beetles found north of Mexico. Barry Knisley, the second author, served as the second president of the Virginia Natural History Society.

Field Guide to Grasshoppers, Katydids, and Crickets of the United States by John L. Capinera, Ralph D. Scott, & Thomas J. Walker. 2004. Cornell University Press. 249 pp. $29.95 (paper). Includes color illustrations of 206 species, many for the first time.

Garden Insects of North America: The Ultimate Guide to Backyard Bugs by Whitney Cranshaw. 2004. Princeton University Press. 656 pp. $99.50 (cloth), $29.95 (paper). A comprehensive guide to the common insects and mites affecting yard and garden plants.

Vernal Pools: Natural History and Conservation by Elizabeth A. Colburn. 2004. McDonald & Woodward Publishing Co. 426 pp. $39.95 (cloth), $29.95 (paper). A comprehensive review of the ecology and biota of vernal (or spring) pools of northeastern United States.

A Guide to Common Freshwater Invertebrates of North America by J. Reese Voshell, Jr. 2002. McDonald & Woodward Publishing Co. 442 pp. $32.95 (paper). A mostly non-technical book geared to students, teachers, and naturalists, it includes a review of the biology and ecology of freshwater organisms and their habitats, plus descriptions and color illustrations of nearly 100 of the most common groups of freshwater invertebrates.

Linnaeus' Philosophia Botanica translated by Stephen Freer. 2005. Oxford University Press. 432 pp. $89.50 (paper). Originally published in Latin in 1751, this is the first full English translation of this classic work since 1775. Nine original engravings and 167 figures show the shapes of leaves and other plant structures. Publication of the original edition helped to promote the Linnaean system of binomial nomenclature in which one word identifies the genus and another the species.

Virginia Natural History Society
http://fwie.fw.vt.edu/vnhs/

General Information

The Virginia Natural History Society (VNHS) was formed in 1992 to bring together persons interested in the natural history of the Commonwealth of Virginia. The VNHS defines natural history in a broad sense, from the study of plants, animals, and other organisms to the geology and ecology of the state, to the natural history of the native people who inhabit it. The goals of the VNHS are to promote research on the natural history of Virginia, educate the citizens of the Commonwealth on natural history topics, and to encourage the conservation of natural resources. Dissemination of natural history information occurs through publication of the journal *Banisteria*, named for John Banister (1650-1692) who was the first university-trained naturalist to work in Virginia. The first issue was published in 1992, and the journal is published twice per year in spring and fall. Articles cover a wide array of subjects, and prospective authors are encouraged to submit manuscripts on any aspect of natural history in Virginia; book reviews and biographies of relevance to natural history in Virginia are also welcomed. The editors of *Banisteria* will also consider manuscripts on any aspect of natural history from neighboring states if the information concerns a species native to Virginia or the topic is directly related to regional archeology, anthropology, botany, ecology, zoology, paleontology, geology, geography, or climatology. Manuscripts are peer-reviewed for suitability and edited for inclusion in the journal. Page charges ($15/page) are waived for VNHS members. The society's website contains instructions for authors, the titles (and abstracts beginning in 2004) of all *Banisteria* papers, and downloadable versions (pdf format) of selected articles from past years.

Memberships

The VNHS is open to anyone with an interest in natural history and welcomes participation by all members in society activities and efforts to promote education and conservation. Membership includes a subscription to *Banisteria* and invitation to the annual Virginia BioBlitz. Annual dues for members are $20 (per calendar year); library subscriptions are $40 per year. Checks should be sent to the Secretary/Treasurer, who also has back issues of *Banisteria* available at $9.00 each (No. 13 is $18.00). The VNHS is a tax-exempt, nonprofit, society under Section 501(C)3 of the IRS. We welcome donations to support our mission in Virginia.

The Virginia Natural History Society Application for Membership

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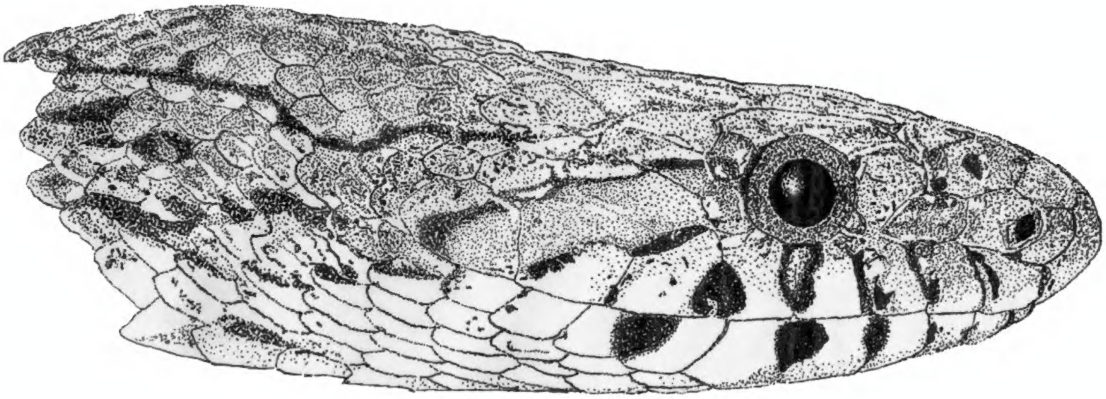

Cornsnake

Elaphe guttata

Greene County, Virginia

del. Wᵐ Brown